No.AU/REG/CER/2026/008/005 **Date: 04.08.2026**

COMPLIANCE SUBMISSION -B2

PROGRAMME: MCA

MODE: ONLINE

SESSION: AUGUST 2026

1.The University has been offering an MCA programme of 91 credits in conventional mode; however, the MCA programme proposed in PPR, approved by the Statutory Body of the University, has 88 credits, and no batch of MCA with 88 credits has been passed out in conventional mode

HEI Response:

The MCA programme structure for Online mode was aligned to the NCrF guidelines and prepared with 88 credits.

Based on the esteem panel observations, the BOS and the Academic council have **approved to follow the traditional mode programme structure for Online MCA, and it would be at 91 credits on par with the regular programme.**

The updated programme structure of OL MCA and the statutory approval documents are attached for reference. The necessary changes have been incorporated. **(Reference: Annexure-1- (Revised PPR-OL MCA and Statutory approval document)**

2. The University has not developed a proper planning/ evaluation methodology for the expected 1000 students of the proposed MCA programme to be offered through OL mode.

HEI Response:

The evaluation methodology for Online mode of learning has been properly planned for the proposed intake of 1000 students and would be in two phases as per the ODL and OL Regulations 2020

Director
Centre for Distance and Online Education
Adamas University

Registrar (Acting)
Adamas University

(1) Internal Assignment at 30% weightage and

(2) Term end examination as a pen and paper exam in the University campus at 70% weightage.

The assessment cycle would be aligned to the semesters, and the Internal Assessments will comprise of minimum two assignments per course at 15 marks each to be submitted within four weeks. This is a mandatory requirement and would be administered through the LMS as a non- proctored assessment.

The term end examinations will comprise of MCQ, Short answer and long answer. The examination would be planned and executed in a maximum of 15 days of time considering the diverse nature of learners especially the professional learners in the online education mode.

The registration for the exams, payment of fees and the hall ticket issue will be digitally managed.

The University has the online assessment platform in place, and the remote proctored assessment tool was demonstrated live during the TEC which the esteem panel members reviewed and appreciated. **The TEC was cleared for platform compliance vide letter dated 7th July, 2026.**

The tech assessment platform and its scalable architecture support effective planning and execution of examinations on a seamless and secured note for thousands of learners. The faculty members are trained for the proctoring of the exams in a live environment and for evaluation through the LMS.

(https://app.assessments.adamasuniversitycdoe.com/Account/LogIn)

The technical team headed by the manager for the online examination is effectively trained and equipped to handle examinations through the online mode. The platform has been tested with pilot study subjecting learners from the traditional mode.

The Online exam conduct policy was duly submitted to the UGC, post VEC observations and the same is now re-submitted. It details the methodology relating to exam planning and evaluation for the online mode.

Director
Centre for Distance and Online Education
Adamas University

Registrar (Acting)
Adamas University
Bh. No.: 9073364733

The University will provide LMS to the students through which the effective teaching, learning and assessment related process will be effectively managed on a seamless note.

The exam policy document pertaining to Online mode is attached for reference. **(Reference: Annexure-2- Online Exam Policy Document)**

3. The programme structure and semester-wise credit load of the proposed MCA programme under OL mode is different from the proposed MCA programme under OL mode is different from the MCA programme offered by the University in conventional mode.

HEI Response:

The MCA programme structure for Online mode was aligned to the NCrF guidelines and prepared with 88 credits.

Based on the esteem panel observations, the BOS and the Academic council have **approved to follow the traditional mode programme structure for Online MCA, and it would be at 91 credits on par with the regular programme.**

The semester wise credits are now similar to the regular mode programme structure. Sem-1 -25, Sem 2- 23, Sem 3-26 and Sem 4- 17- Total 91 credits.

The updated programme structure of OL MCA is attached for reference, and the necessary changes have been incorporated across.

(Ref: Annexure-1- (Revised PPR-OL MCA and Statutory approval document)

4. The E-LM needs to be more interactive, with the appropriate use of graphics, animations, and simulations, and video demonstrations.

HEI Response:

The esteem Panel observations have been noted, and the ELM has been enhanced with appropriate use of graphics, animations and simulations and video demonstrations in alignment to the course topics and requirement.

Sharing a few URL links of the improvised content assets for quick reference.

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MCA - Sem - 1 - Computer Organization & Architecture

Unit – 2: Peripheral Devices and Memory System Design 2.5 Programs, Processes, and State Transitions

https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6102

MCA - Sem - 1 - Numerical & Statistical Methods

Unit – 2: Correlation, Regression and Curve Fitting 2.1 Introduction to Correlation

https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6251

MCA - Sem - 2 - Database Management System

Unit – 9: Advanced Database Topics - 9.3 Data Mining

https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=9570

MCA - Sem - 2 Discrete Mathematics

Unit – 4: Advanced Counting Techniques 4.1 Recurrence Relations

https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=10123

Also attaching the 4 quadrant ELM content links of the programme for submission.

(Ref: Annexure-3 -ELM links as per 4 quadrants -Google drive link)

Prof. (Dr.) Shauvik Roy Chowdhury
Director, CDOE

Director
Centre for Distance and Online Education
Adamas University

Dr. Rajat Ray
Registrar (Acting)

ADAMAS UNIVERSITY
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Adamas University
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26th Academic Council Meeting, Adamas University

Date: 03.08.2026 **Time: 12:00 PM** **Mode: Hybrid**

Attendance Sheet

1.	**Prof. Suranjan Das** Hon'ble Vice Chancellor	3/8/26
2.	**Prof. (Dr.) Souvik Roy** **Dean,** School of Law and Justice	3/8/26
3.	**Dr. Moumita Dey** **Associate Dean,** School of Basic and Applied Sciences	Moumita Dey 3/8/26
4.	**Dr. Joy Das** **Associate Dean,** School of Liberal Arts and Culture Studies	Joy Das 03/08/2026.
5.	**Prof. (Dr.) Susmit Bagchi** **Dean,** School of Engineering and Technology	3/8/26
6.	**Dr. Kuldeep Siwach** **Associate Dean,** School of Media and Communication	3/8/26
7.	**Prof. Rudra Prasad Saha** **Dean,** School of Life Science and Biotechnology	3.8.26
8.	**Prof. (Dr.) Bharat Chandra Saha** **Dean,** School of Smart Agriculture	B C Saha 03.08.26
9.	**Prof. (Dr.) Md Saquib Hasnain** **Dean,** School of Health and Medical Sciences	Hasnain 03/08/2026
10.	**Prof. (Dr.) Keya Das Ghosh** **Dean,** School of Education	Ghosh 3.8.26
11.	**Prof. (Dr.) Indranil Bose** Associate Dean, School of Business	Absent
12.	**Prof. (Dr.) Moumita Mukherjee** **Dean**, Research & Development	3/8/2026.
13.	**Prof. (Dr.) Shauvik Roy Chowdhury** Director, CDOE	03/08/26
14.	**Prof. (Dr.) Samprit Chakrabarti** Deputy Director, CDOE	
15.	**Dr. Sankhayan Choudhury** Professor and Head Department of Computer Science and Engineering The University of Calcutta Mob: 9433040414 Email ID- sccomp@caluniv.ac.in sankhayan@gmail.com	Absent

16.	**Prof. (Dr.) Radha Tamal Goswami** Pro- Vice Chancellor (Research), Adamas University	3/8/2026
17.	**Dr. Chiranjib Chakravartty** JC Bose Chair Professor, School of Life Science & Biotechnology	Absent
18.	**Dr. Sanjay Dey** Professor, School of Health and Medical Sciences	Online present
19.	**Dr. Rakesh Das** Professor, School of Health and Medical Sciences	Absent
20.	**Dr. Partha Basu** Professor, School of Basic and Applied Sciences	Absent
21.	**Dr. Aparajita Bhattacharya** Professor, School of Basic and Applied Sciences	Absent
22.	**Dr. Abhisek Santra** Professor, School of Basic and Applied Sciences	Absent
23.	**Dr. Subenoy Chakraborty** Honorary Adjunct Professor, School of Basic and Applied Sciences	Absent
24.	**Dr. Ruby Sain** Professor Emeritus, School of Liberal Arts and Culture Studies	Absent
25.	**Dr. Manas Ranjan Gupta** Professor Emeritus, School of Liberal Arts and Culture Studies	Absent
26.	**Dr. Trdib Chakraborti** Professor Emeritus, School of Liberal Arts and Culture Studies	Absent
27.	**Dr. Nandini Dhar** Professor, School of Liberal Arts and Culture Studies	Absent
28.	**Dr. Sajal Saha** Professor, School of Engineering and Technology	03.08.26
29.	**Dr. Abhishek Roy** Professor, School of Engineering and Technology	08/08/2026
30.	**Dr. Debdutta Pal** Professor, School of Engineering and Technology	03/8/26
31.	**Dr. Himansu Sekhar Guha** Professor Emeritus, School of Basic and Applied Sciences	Absent

32.	**Dr. Biswajit Basu** Professor, School of Health and Medical Sciences	Absent
33.	**Dr. Rajat Ray** Professor Emeritus, School of Health and Medical Sciences	Absent
34.	**Dr. Sonali Rudra** Professor of Practice, School of Health and Medical Sciences	Absent
35.	**Dr. Sandip Banerjee** Professor, School of Smart Agriculture	Online present.
36.	**Dr. Goutam Tanty** Professor, School of Business	
37.	**Dr. Biswajit Halder** Professor, School of Engineering and Technology	Online present.
38.	**Dr. Arijit Bhattacharya** Professor, School of Life Science and Biotechnology	Online present.
39.	**Dr. Debasish Chakraborty** Professor, School of Business	Absent
40.	**Dr. Kasturi Mukherjee** Professor, School of Basic and Applied Sciences	Online present.
41.	**Dr. Kaushayee Banerjee** Professor, School of Liberal Arts and Culture Studies	Kaushayee Banerjee 03/08/26.
42.	**Dr. Moumita Gangopadhyay** Professor, School of Life Science and Biotechnology	Absent
43.	**Dr. Krishnangshu Ray** Professor, School of Health and Medical Sciences	Absent
44.	**Dr. Anirban Mukherjee** Professor, School of Engineering and Technology	Anirban Mukherjee 03/08/2026
45.	**Dr. Amitava Sen** Professor Emiretus, School of Engineering and Technology	Absent
46.	**Dr. Ranjana Banerjee** Professor, School of Education	Absent
47.	**Dr. Ananda Kumar Chettupalli** Professor, School of Health and Medical Sciences	Absent
48.	**Dr. Siddhartha Roy** Distinguished Research Professor, School of Basic and Applied Sciences	Absent

49.	**Dr. Sibaji Pratim Basu** Distinguished Research Professor, School of Liberal Arts and Culture Studies	Absent
50.	**Dr. Pritha Mukhopadhyay** Distinguished Research Professor, School of Health and Medical Sciences	Absent
51.	**Dr. Maitree Bhattacharya** Distinguished Research Professor, School of Life Science and Biotechnology	Absent
52.	**Dr. Viney Kapoor Mehra** Emeritus Professor, School of Law and Justice	Online present.
53.	Head, Department of Commerce, SoB	Meeta Bose
54.	Head, Department of Management, SoB	
55.	Head, Department of Pharmaceutical Technology, SoHMS	Online present.
56.	Head, Department of Allied Health Sciences, SoHMS	Pabla Chakra 03/08/26
57.	Head, Department of Psychology, SoHMS	Absent
58.	Head, Department of Law, SoLJ	Absent
59.	Head, Department of Education, SoE	Brotati Chakraborty 03/8/26
60.	Head, Department of Language & Literature, SoLACS	Absent
61.	Head, Department of Humanities and Social Sciences, SoLACS	Online present.
62.	Head, Department of Economics, SoLACS	Online present.
63.	Head, Department of Civil Engineering, SoET	03/08/26
64.	Head, Department of Computer Science & Engineering, SoET	
65.	Head, Department of Computer Application, SoET	03/08/26.
66.	Head, Department of Mechanical Engineering, SoET	Mohd. Qulsam 3/8/2026.
67.	Head, Department of Electrical & Electronics Engineering, SoET	3/8/26.
68.	Head, Department of Chemistry, SoBAS	Online present.
69.	Head, Department of Physics, SoBAS	Online present.

70.	Head, Department of Mathematics, SoBAS	Supriyo Mazumder 03/08/26
71.	Head, Department of Geography, SoBAS	Online present.
72.	Head, Department of Forensic Science, SoBAS	Absent
73.	Head, Department of Media Studies, SoMC	Sumati Agarwal 03/8/26.
74.	Head, Department of Agriculture, SoSA	Online present.
75.	Head, Department of Biotechnology, SoLB	Online present.
76.	Head, Department of Biological Sciences, SoLB	Online present.
77.	**Mr. S.K Sarkar** Executive Vice Chairman, SKRMT	Absent
78.	**Prof. (Dr.) Snehamanju Basu** Pro Vice- Chancellor & Director-IQAC	03.08.26.
79.	**Dr. Joy Basu** Associate Professor, School of Health and Medical Sciences	3.08.2026
80.	**Dr. Ujjwal Kumar Neogi** Director, School of Smart Agriculture	Absent
81.	**Controller of Examinations**	03.08.2026
82.	**Mr. Nirmalya Chakraborty** Law Officer	03.08.2026
83.	**Dr. Manoj Kumar Singh** Associate Dean, School of Life Science and Biotechnology	Online present.
84.	**Registrar**	03/8/2026

Minutes of the 26th Meeting of Academic Council held on Saturday, 03rd August 2026 at 12.00 PM: Mode: Hybrid

The following members were present:

1. Prof (Dr.) Suranjan Das - Hon'ble Vice Chancellor – Chairman
2. Prof. (Dr.) Radha Tamal Goswami, Pro-Vice Chancellor (Research)
3. Prof. (Dr.) Susmit Bagchi, Dean, SoET
4. Prof. (Dr.) Moumita Mukherjee, Dean, R &D
5. Dr. Moumita Dey, Associate Dean, SoBAS
6. Dr. Kuldeep Siwach, Associate Dean, SoMC
7. Dr. Joy Das, Associate Dean, SoLACS
8. Prof. (Dr.) Souvik Roy, Dean, SoLJ
9. Prof. (Dr.) Keya Das Ghosh, Dean, SoE
10. Prof. (Dr.) Md. Saquib Hasnain, Dean, SoHMS
11. Prof. (Dr.) Bharat Chandra Saha, Dean, SoSA
12. Prof. (Dr.) Rudra Prasad Saha, Dean, SoLB
13. Prof. (Dr.) Shauvik Roy Chowdhury, Director-CDOE
14. Prof. (Dr.) Samprit Chakraborty, Deputy Director, CDOE
15. Dr. Rajat Ray, Registrar (Acting)
16. Dr. Sanjay Dey, Associate Dean (Department of Pharmaceutical Technology), SoHMS
17. Dr. Joy Basu, Associate Dean (Department of Allied Health Sciences), SoHMS
18. Dr. Sajal Saha, Professor & Associate Dean, SoET
19. Dr. Sandip Banerjee, Professor & Associate Dean, SoSA
20. Dr. Vaskar Sarkar, Controller of Examinations
21. Dr. Sudipta Majumder, HoD, Department of Management, SoB
22. Dr. Uttiya Basu, HoD, Department of Commerce, SoB
23. Dr. Arijit Bhattacharya, HoD, Department of Biological Science, SoLB
24. Dr. Rajib Majumder, HoD, Department of Biotechnology, SOLB
25. Dr. Semanti Chakraborty, HoD, Department of EEE, SoET
26. Dr. Hasim Ali Khan, HoD, Department of Civil Engineering, SoET
27. Dr. Mohammad Zubair, HoD, Department of Mechanical Engineering, SoET
28. Dr. Supriyo Mazumder, HoD, Department of Mathematics, SoBAS
29. Dr. Rupam Sen, HoD, Department of Chemistry, SoBAS
30. Dr. Subhendu Kumar Sahoo, HoD, Department of Pharmaceutical Technology, SoHMS
31. Mr. Pablo Chandra, Teacher In Charge, Department of Allied Health Sciences, SoHMS
32. Dr. Brotati Chakraborty, HoD, Department of Education, SoE
33. Dr. Swati Agarwal, HoD, Department of Media Studies, SoMC
34. Dr. Kasturi Mukherjee, HoD, Department of Geography, SoBAS
35. Dr. Snehamanju Basu, Pro Vice-Chancellor & Director-IQAC
36. Dr. Abhishek Roy, Professor, SoET
37. Mr. Nirmalya Chakraborty, Law Officer
38. Dr. Biswajit Halder, Professor, SoET
39. Dr. Debdutta Pal, Professor, SoET
40. Dr. Kausheyee Banerjee, Professor, SoLACS
41. Dr. Goutam Tanty, Professor, SoB
42. Dr. Anirban Mukherjee, Professor, SoET
43. Dr. Viney Kapoor Mehra, Emeritus Professor, SoLJ

03/8/2026

ADAMAS UNIVERSITY BARASAT, KOL-126

Leave of Absence:

1. Dr. Sankhayan Choudhury, Professor and Head, Department of Computer Science and Engineering, The University of Calcutta
2. Mr. S. K. Sarkar, Executive Vice Chairman, SKRMT
3. Dr. Himanshu Sekhar Guha, Professor Emeritus, SoBAS
4. Dr. Partha Basu, Professor, SoBAS
5. Dr. Tridib Chakraborti, Professor Emeritus, SoLACS
6. Dr. Abhisek Santra, Professor, SoBAS
7. Dr. Rajat Ray, Professor Emiratus, SoHMS
8. Dr. Chiranjib Chakravarty, JC Bose Chair Professor, SoLB
9. Dr. Rakesh Das, Professor, SoHMS
10. Dr. Subenoy Chakraborty, Honorary Adjunct Professor, SoBAS
11. Dr. Ruby Sain, Professor Emeritus, SoLACS
12. Dr. Manas Ranjan Gupta, Professor Emeritus, SoB
13. Dr. Indranil Bose, Professor & Associate Dean, SoB
14. Dr. Saroj Kumar Amar, HoD, Department of Forensic Science, SoBAS
15. Dr. Aparajita Bhattacharya, Professor, SoBAS
16. Dr. Nandini Dhar, Professor, SoLACS
17. Dr. Debasish Chakraborty, Professor, SoB
18. Dr. Moumita Gangopadhyay, Professor, SoLB
19. Dr. Ranjana Banerjee, Professor, SoE
20. Dr. Siddhartha Roy, Distinguished Research Professor, SoBAS
21. Dr. Shibaji Pratim Basu , Distinguished Research Professor, SoLACS
22. Dr. Pritha Mukhopadhyay, Distinguished Research Professor, SoHMS
23. Dr. Maitree Bhattacharya, Distinguished Research Professor, SoLB
24. Dr. Moumita Mukherjee, HoD, Department of Psychology, SoHMS
25. Dr. Micah K Thambi, HoD, Department of Language & Literature, SoLACS
26. Dr. Swatilekha Mondal, HoD, Department of Law, SoLJ
27. Dr. Ujjwal Kumar Neogi, Director, SoSA
28. Dr. Sonali Rudra, Professor of Practice, SoHMS
29. Dr. Amitava Sen, Professor Emiretus, SoET
30. Dr. Ananda Kumar Chettupalli, Professor, SoHMS
31. Dr. Krishnangshu Ray, Professor, SoHMS
32. Dr. Biswajit Basu, Professor, SoHMS

At the outset, the Hon'ble Vice Chancellor, Prof. (Dr.) Suranjan Das, welcomed the esteemed members of the Academic Council. The Chairman expressed gratitude to all members for their presence and active participation.

The agenda items were taken up for consideration and/or ratification, as applicable:

<u>Agenda</u>

Members: 83
Quorum-28

Item No. AC 26.1: Approval of the Revised Programme Structure, Programme Project Report (PPR), and Self-Learning Material (SLM)/E-Learning Material (ELM) of the Master of Business Administration (MBA) Programme under Open and Distance Learning (ODL) and Online Learning (OL) Modes

03/08/2026

The Academic Council is requested to consider and approve the revised Programme Structure of the Master of Business Administration (MBA) programme offered under the Open and Distance Learning (ODL) and Online Learning (OL) modes.

As advised by the Virtual Expert Committee (VEC) and the Expert Committee Recommendations dated 29th July 2026, the programme structure has been revised to bring it in consonance with the corresponding conventional MBA programme. The revised structure pertains to the 2024–25 batch, which already been passed out with 110 credits.

The Council is further requested to consider and approve the revised Programme Project Report (PPR), prepared in accordance with the UGC (Open and Distance Learning Programmes and Online Programmes) Regulations and Guidelines. The improvements suggested by the VEC panel has been incorporated and improvisation done. The revised SLM/ELM content are passed through for statutory body approval.

The detailed syllabus, programme structure, eligibility criteria, course framework, and the revised PPR, SLM, and ELM are placed at Annexure–I for consideration and approval.

- **Resolution:**

After detailed discussion, the Council accepted and approved the above agenda items as proposed by the Director-CDOE.

- **Action will be taken by: Director -CDOE.**

Item No. AC 26.2: Approval of Program structure, revised PPR and revised ELM of MCA Programme under OL Mode

As advised by the Virtual Expert Committee (VEC) and Expert Committee Recommendations, the programme structure has been revised to align it with the corresponding conventional MCA programme. The revised structure pertains to the 2024–25 batch, which has already completed the programme, and comprises 91 credits.

The Council is further requested to consider and approve the revised Programme Project Report (PPR), prepared in accordance with the UGC (Open and Distance Learning Programmes and Online Programmes) Regulations and Guidelines. The improvements suggested by the VEC panel has been incorporated and improvisation done. The revised ELM content is passed through for statutory body approval.

The detailed syllabus, programme structure, eligibility criteria, course framework, and the revised PPR and ELM are placed at Annexure–II for consideration and approval.

- **Resolution:**

After detailed discussion, the Council accepted and approved the above agenda items as proposed by the Director-CDOE.

- **Action will be taken by: Director-CDOE**

ADAMAS UNIVERSITY BARASAT

03/08/2026

Registrar (Acting)
Member Secretary

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Adamas University
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ADAMAS UNIVERSITY
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SCHOOL OF ENGINEERING & TECHNOLOGY

Minutes of the SOET Faculty Council Meeting held on 1st August, 2026

Video call link: https://meet.google.com/rtj-nerr-act

Reference No: FC/SOET/CA/002/01-08-26

Members present: Faculty Council

Sl. No.	Name	Designation	Role	Signature
1	Prof. (Dr.) Suranjan Das	Honorable Vice-Chanceller	Chairman	
2	Prof. (Dr.) Radha Tamal Goswami	Pro Vice Chancellor and ~~Dean, School of Engineering and Technology~~	Member	
3	Prof. (Dr.) Shauvik Roy Chowdhury	Professor, School of Business And Director – Center for Distance and Online Education (CODOE)	Invitee	
4	Prof. Dr. Susmit Bagchi	DEAN, School of Engineering and Technology	Member	3/8/26
5	Prof. Dr. Anirban Mukherjee	Professor, CSE and Director (Campus to Corporate), Adamas University	Member	
6	Prof. (Dr.) Sajal Saha	Associate Dean, School of Engineering and Technology and Head, Dept. of Computer	Member	

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DEPARTMENT OF COMPUTER APPLICATION

7	Prof. (Dr.) Abhishek Roy	Professor and Head, Dept. of Computer Application	Member	
8	Prof. (Dr.) Biswajit Halder	Professor, Dept. of Computer Application	Member	01/08/26
9	Prof. (Dr.) Debdutta Pal	Professor, Dept. of Computer Science and Engineering	Member	
10	Dr. Soumitra Roy	Associate Professor	Member	
11	Dr. Tamal Ghosh	Associate Professor	Member	
12	Dr. Bodhi Chakraborty	Assistant Professor, Dept. of Computer Science and Engineering	Member	
13	Dr. Arindam Banerjee	Assistant Professor	Member	
14	Dr. Tahamina Yesmin	Assistant Professor	Member	

ADAMAS UNIVERSITY

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SCHOOL OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF COMPUTER APPLICATION

Item	Agenda	Resolution:
Item 1	**Revised Online MCA Programme Structure:** As advised by the Vurtual Expert Committee (VEC) and Expert Committee Recommendations the OL Mode MCA programme structure has been revised to align it with corresponding conventional MCA programme. The revised structure pertains to the 2025 POB batch which has already completed the programme and comprises 91 credits. The same is already approved by the BOS in its meeting held on 01.08.2026.	The revised program structure of the Online MCA program with 91 credits was agreed upon by all members and hence approved by the FC.
Item 2	**Revised PPR, ELM, detailed syllabus, course framework for Online MCA Programme:** The Programme Project Report (PPR), prepared in accordance with the UGC (Open and Distance Learning Programmes and Online Programmes) Regulations and Guidelines, together with the E-Learning Material (ELM), detailed syllabus, course framework are now aligned with the revised programme structure of Online MCA (with 91 credits) and already approved by the BOS in its meeting held on 01.08.2026.	The PPR, ELM, syllabus and other course details of the Online MCA program with 91 credits were checked by the members and were finally approved by the FC.

Prepared by:
Dr. Abhishek Roy,
Professor and HOD,
Department of Computer Application,
SOET, Adamas University

Dr. Abhishek Roy
Professor & Head
Dept. of Computer Application
Adamas University, Kolkata, India
Tel. +91-9476134119

Verified By:
Dr. Sajal Saha
Professor and Associate-Dean,
SOET, Adamas University

ADAMAS UNIVERSITY

SCHOOL OF ENGINEERING AND TECHNOLOGY

Minutes of the Meeting of the Board of Studies
Department of Computer Application
Date & Time: 01/08/2026 & 11:00 AM
Venue: Online Google Meet link: https://meet.google.com/xdv-uucy-dud

Reference No: BOS/CDOE/CA/002/31-07-26

Members Present: Online

Sl. No.	Name	Designation	Role
1	Prof. (Dr.) Abhishek Roy	Professor and Head, Dept. of Computer Application	Chairman
2	Prof. (Dr.) Radha Tamal Goswami	Pro Vice Chancellor and Professor, School of Engineering and Technology	Member
3	Prof. (Dr.) Sankhayan Choudhury	Professor, Dept. of Computer Science and Engineering, Calcutta University	External Expert
4	Prof. (Dr.) Susmit Bagchi	Professor and Dean, School of Engineering and Technology	Member
5	Prof. (Dr.) Anirban Mukherjee	Professor, CSE Dept. and the Director (Campus to Corporate), Adamas University	Member
6	Prof. (Dr.) Sajal Saha	Associate Dean, School of Engineering and Technology	Member
7	Prof. (Dr.) Biswajit Halder	Professor, Dept. of Computer Application	Member
8	Dr. Soumitra Roy	Associate Professor, Dept. of Computer Application	Member
9	Dr. Tamal Ghosh	Associate Professor, Dept. of Computer Application	Member
10	Dr. Bodhi Chakraborty	Assistant Professor, School of Engineering and Technology	Member
11	Dr. Arindam Banerjee	Assistant Professor, Dept. of Computer Application	Member
12	Dr. Tahamina Yesmin	Assistant Professor, Dept. of Computer Application	Member

Agenda Items

1. Approval of Revised Programme Structure with 91 Credits for Online (OL) MCA programme
2. Approval of Revised Programme Project Report (PPR) and e-Learning Materials (ELM), detailed syllabus, eligibility criteria, course framework for Online (OL) MCA programme

Agenda-wise Discussions and Resolutions:

1. **Revised Online MCA Programme Structure:** As advised by the Vurtual Expert Committee (VEC) and Expert Committee Recommendations the OL Mode MCA programme structure has been revised to align it with corresponding conventional MCA programme. The revised structure pertains to the 2025 POB batch which has already completed the programme and comprises 91 credits.

   Resolution: The revised MCA Programme Structure with 91 credits was reviewed and formally approved by the Board.

2. **Revised PPR, ELM, detailed syllabus, course framework for Online MCA Programme:**

   The Programme Project Report (PPR), prepared in accordance with the UGC (Open and Distance Learning Programmes and Online Programmes) Regulations and Guidelines, together with the E-Learning Material (ELM), detailed syllabus, course framework are now aligned with the revised programme structure.

   Resolution: The Board reviewed and discussed the PPR, ELM and other details whether properly aligned with revised program structure (with 91 credits) of online MCA programme. After detailed deliberation, the same were approved.

Prepared by:
Dr. Arindam Banerjee,
Department of CA,
Adamas University

Prof. (Dr.) Biswajit Halder
Department of CA,
Adamas University

Verified by:
Prof. (Dr.) Abhishek Roy,
Chairman, Board of Studies (BoS),
Professor and Head,
Dept. of Computer Application,
Adamas University

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ADAMAS UNIVERSITY

Centre for Distance and Online Education

Programme Project Report (PPR)

“Master of Computer Applications”

Online Mode

ADAMAS UNIVERSITY
KOLKATA
PURSUE EXCELLENCE

CONTENTS

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1. About Adamas University

Adamas University is UGC-recognised and NAAC 'A' accredited, with program approvals from AICTE, BCI, PCI and NCTE for relevant disciplines, indicating compliance with national quality standards.

The University offers a diverse portfolio of undergraduate, postgraduate, and doctoral programs across disciplines such as engineering, science, management, law, media, agriculture, and more, promoting interdisciplinary learning.

2. PREAMBLE

PRELIMINARY DEFINITIONS AND NOMENCLATURE

In these Regulations, unless the context otherwise requires

i. "**Programme**" means Post-graduate Degree Programme offered under Online Learning (OL).

ii. "**Course**" means a Theory/Project work and any other subject that is normally studied in a semester.

iii. "**Institution**" means ADAMAS University.

iv. "**Academic Council**" means the Academic Council, which is the apex body on all academic matters of ADAMAS University.

v. "**Controller of Examinations**" means the Controller of Examinations of ADAMAS University, who is responsible for the conduct of examinations and declaration of results.

vi. "**Director**" means the Director of the Centre for Distance and Online Education (CDOE), CDOE is a part of ADAMAS University. ADAMAS University credentials – 12 years in existence.

vii. "**Online Learning**" means a mode of providing flexible learning opportunities by overcoming the separation of teacher and learner using the internet, learning materials and full-fledged programme delivery through the internet using technology-assisted mechanism and resources.

viii. "**Electronic e-Module (ELM) for Online mode**" means a modular unit of course material in e-learning form which is inter alia of course material in e-learning form which is inter alia self-explanatory, self-contained, self-directed at the learner, and amenable to self-evaluation, and enables the learner to acquire the prescribed level of learning in a course of study and includes contents in the form of a combination of the following e-Learning content, namely

- e-Text Materials
- Audio Podcasts
- Video Lectures
- Audio-Visual interactive material
- Virtual Classroom Zoom/Team/WebEx/Google Class Room sessions
- Virtual Simulation labs and
- Self-Assessment Quizzes or Tests

3. CONTENTS OF PROGRAMME PROJECT REPORT (PPR)

I. Programme's Mission and Objectives:

The mission and objectives are as follows;

1. The mission is to teach and prepare liberally educated, articulate, and skilled computer scientists and software engineers for leadership and professional careers and for advanced study.
2. A central objective of the program is to contribute to society by advancing the fields of computer science and software engineering through innovations in teaching and research, thus enhancing student knowledge through interactive instruction, global engagement, and experiential learning.
3. The program will serve as a resource to inform society about innovations related to the production and uses of computers and software.
4. To impart moral and ethical values, and interpersonal skills to the students.
5. To develop software solutions to problems across a broad range of application domains through analysis and design.
6. To contribute to research of their chosen field and function and communicate effectively, to perform both individually and in a multi-disciplinary team.
7. To continue the process of life-long learning through professional activities, adapt themselves with ease to new technologies, while exhibiting high ethical and professional standards.

II. Relevance of the program with HEI's mission and goals:

The MCA program in Computer Science and Engineering is closely aligned with the mission and goals of a Higher Education Institution (HEI), contributing across several key aspects:

1. Specialization in a Niche Area: The MCA program in Computer Science and Engineering aligns with the HEI's strategic emphasis on niche specializations, demonstrating its commitment to industry relevance and the development of specialized human resources.
2. Industry Collaboration and Partnerships: The MCA programme fosters strong industry collaborations through partnerships that support internships, live projects and expert lectures.
3. Career-Oriented Education: The MCA programme is envisioned to deliver career-focused education that bridges academic knowledge with professional practice, thereby enhancing employability and career progression.
4. Global Perspective and Internationalization: The MCA programme integrates global perspectives in its curriculum by incorporating internationally relevant content, emerging technologies, and global best practices in computer science.
5. Contribution to Economic Development: The MCA programme contributes to economic development by producing skilled IT professionals who support the growth of the software, services, and digital technology sectors.
6. Sustainability and Ethical Practices: The MCA programme integrates principles of sustainability by promoting responsible use of computing resources and energy-efficient technologies. Ethical practices are embedded in the curriculum through courses and modules addressing professional ethics, data privacy, cybersecurity, and social responsibility in computing.

VISION:

To develop well-grounded, socially responsible engineers and technocrats in a way to create a transformative impact on Indian society through continual innovation in education, research, creativity and entrepreneurship.

MISSION:

1. Build a transformative educational experience through disciplinary and inter- disciplinary knowledge, problem solving, and communication and leadership skills.
2. Develop a collaborative environment open to the free exchange of ideas, where research, creativity, innovation and entrepreneurship can flourish among individual students.
3. Impact society in a transformative way – regionally and nationally - by engaging with partners outside the borders of the university campus.
4. Promote outreach programs which strives to inculcate ethical standards and good character in the minds of young professionals.

III. Nature of prospective target group of learners:

The intended target learners for the online MCA programme in Computer Science and Engineering are Graduates with a background in Computer Science, Information Technology, Mathematics, or allied disciplines who aspire to build advanced careers in computing and software development.

1. Learners from diverse locations seeking flexible, location-independent access to a specialized MCA programme in Computer Science and Engineering from a reputed institution
2. Learners aiming for industry-oriented careers in IT, software services, digital technologies, and related sectors.
3. Individuals motivated to develop problem-solving, analytical, and technical skills aligned with contemporary industry and societal needs.
4. The online mode offers flexibility in learning, making it suitable for diverse learners by allowing self-paced study while ensuring access to quality education beyond geographical and occupational constraints.

IV. Appropriateness of programme to be conducted in Online mode to acquire specific skills and competence:

An MCA programme in Computer Science and Engineering delivered through the online mode is well suited for developing specialized skills and competencies for the following reasons:

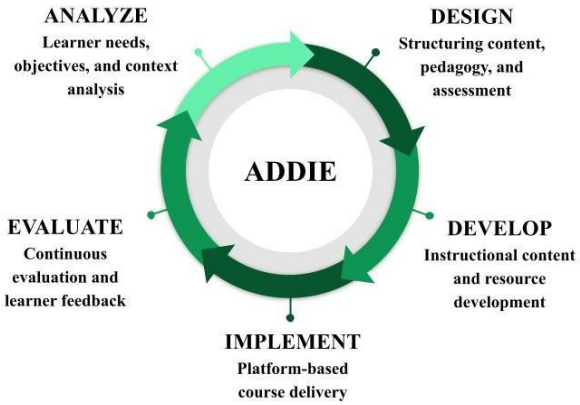
1. Learning Flexibility and Wider Access: Enables learners to pursue higher education at their own pace and convenience, irrespective of location or professional commitments.
2. Industry-Aligned Curriculum: Aligns academic content with current industry practices, emerging technologies, and professional skill requirements.
3. Global Access and Diversity: Provides opportunities for interaction among learners from diverse geographical, cultural, and professional backgrounds.
4. Technology-Driven Teaching and Learning: Leverages advanced digital platforms and tools to enhance learning through interactive and technology-driven pedagogies.
5. Professional Networking: Facilitates collaboration and professional networking with peers, faculty, and industry experts across regions.
6. Cost Efficiency in Learning: Reduces overall educational costs by minimizing expenses related to travel, accommodation, and infrastructure.
7. Alignment with Emerging Industry Trends: Allows timely updates to curriculum and learning resources to keep pace with rapid technological advancements.

V. Instructional Design:

Instructional design refers to the systematic process of planning, developing, and delivering effective learning materials and educational programmes. It is applicable to both face-to-face and virtual learning environments, including online courses.

The programme follows the ADDIE instructional design model, which comprises the following five stages:

- Analyze - Identification of learner needs, objectives, and learning context.
- Design - Structuring of course content, learning strategies, and assessment methods.
- Develop - Creation of instructional materials and learning resources.
- Implement - Delivery of the course through appropriate instructional platforms.
- Evaluate - Continuous assessment and feedback to improve learning effectiveness.



PRO's of ADDIE Model:

- ADDIE provides a clear, systematic training design framework.
- The model is structured yet adaptable to diverse learning needs.
- ADDIE focuses on learner needs and objectives for effective training.
- It drives ongoing evaluation to improve training outcomes.
- The ADDIE model is widely recognized, which enables effective professional collaboration.

a. Curriculum Design & Credit Structure

COURSE STRUCTURE

(Semester wise)

FIRST SEMESTER				
Course Code	**Subject**	**Category**	**L-T-P-H**	**Credit**
OLMCA101T	Introduction to Programming	Major	3-0-0-3	3
OLMCA101P	Introduction to Programming-LAB	Major	0-0-3-3	2
OLMCA102T	Computer Organization & Architecture	Major	3-0-0-3	3
OLMCA102P	Computer Organization & Architecture-LAB	Major	0-0-3-3	2
OLMCA103T	Operating System	Major	3-0-0-3	3
OLMCA103P	Operating System-LAB	Major	0-0-3-3	2
OLMCA104	HSSM1-Business Communication	HSSM-1	2-0-0-2	2
OLMCA105T	Numerical & Statistical Methods	Minor	3-0-0-3	3
OLMCA105P	Numerical & Statistical Methods-LAB	Minor	0-0-3-3	2
OLMCA106T	Software Engineering	Major	3-0-0-3	3
				25

SECOND SEMESTER				
Subject Code	**Subject**	**Category**	**L-T-P-H**	**Credit**
OLMCA201	Switching Circuits and Logic Design	Major	3-0-0-3	3
OLMCA202T	Object Oriented Programming with Java	Major	3-0-0-3	3
OLMCA202P	Object Oriented Programming with Java-LAB	Major	0-0-3-3	2
OLMCA203T	Data Structures	Major	3-0-0-3	3
OLMCA203P	Data Structures-LAB	Major	0-0-3-3	2
OLMCA204T	Database Management System	Major	3-0-0-3	3
OLMCA204P	Database Management System-LAB	Major	0-0-3-3	2
OLMCA205	Discrete Mathematics	Minor	3-0-0-3	3
OLMCA206P	Python Programming-LAB	Minor	3-0-0-3	2
				23

THIRD SEMESTER				
Course Code	**Subject**	**Category**	**L-T-P-H**	**Credit**
OLMCA301	Design and Analysis of Algorithms	Major	3-0-0-3	3
OLMCA302	Data Communication & Computer Network	Major	3-0-0-3	3
OLMCA303	Graph Theory	Major	3-0-0-3	3
OLMCA304	Formal Language and Automata Theory Network Systems	Major	3-0-0-3	3
OLMCA305/306 T	Discipline Specific Elective-1	Major	3-0-0-3	3
OLMCA305/306 P	Discipline Specific Elective-1 -LAB	Major	0-0-3-3	2
OLMCA307/308	Discipline Specific Elective-2	Major	3-0-0-3	3
OLMCA310	Web Technology Lab	Minor	0-0-3-3	2
OLMCA311	Mobile Applications using Android/IOS Lab	Minor	0-0-3-3	2
OLMCA312	Project- 1	PW-minor	0-0-3-3	2
				26

FOURTH SEMESTER				
Course Code	**Subject**	**Category**	**L-T-P-H**	**Credit**
OLMCA401T/402T	Discipline Specific Elective-3	Major	3-0-0-3	3

OLMCA401P/402P	DSE-3 -LAB	Major	0-0-3-3	2
OLMCA403	Compiler Design	Minor	3-0-0-3	3
OLMCA404	HSS-VI (Basics of Organizational Behaviours)	HSS-V1	3-0-0-3	3
OLMCA405	Seminar	Seminar	0-2-0-2	2
OLMCA406	Major Project- Internship Embedded Project work & Viva Voce (or) Research work, Dissertation & Thesis	PW-Major	0-0-8-8	4

Student can choose one Elective course from each Pool	
Course Code	**DSE-1 (To choose one course(T+P))**
OLMCA305T	Artificial Intelligence and Machine Learning
OLMCA306T	Fundamentals of Cloud Computing
OLMCA305P	Artificial Intelligence and Machine Learning-LAB
OLMCA306P	Fundamentals of Cloud Computing-LAB
Course Code	**DSE-2 (To Choose one course)**
OLMCA307	Natural Language Processing and Its Application
OLMCA308	Data Warehousing & Analytics
Course Code	**DSE-3 (To Choose one)**
OLMCA401T	Public Block Chain
OLMCA401P	Public Block Chain-LAB
OLMCA402T	Cyber Security and Cryptography
OLMCA402P	Cyber Security and Cryptography-LAB

Credit Distribution Summary					
Category	**S1**	**S2**	**S3**	**S4**	**Total**
Major	**18**	**18**	**20**	**5**	**61**
Minor	**5**	**5**	**4**	**3**	**17**
HSSM-1	**2**				**2**
HSS-VI				**3**	**3**
Project-1-Minor			**2**		**2**
Seminar				**2**	**2**
Major project/OJT				**4**	**4**
Total Credits	**25**	**23**	**26**	**17**	**91**

CREDIT DISTRIBUTION (YEAR-WISE)

YEAR I	YEAR II	TOTAL
48	43	91

b. Detailed Syllabi

Detailed Syllabus for the Programme / Courses is attached in Annexure

c. Duration of the Program

The Programme can be completed in a minimum of 2 years, and a maximum of 4 years, as per UGC Regulations.

d. Faculty & Support Staff Requirements

Faculty shall be allocated as per the requirements stipulated in the UGC Regulations & Guidelines.

Support Staff also shall be allocated, as per the guidelines, for the first 5000 students shall be ensured at all times.

e. Instruction Delivery Mechanisms

As per the UGC Regulations 2020 for Open and Distance Learning (ODL) and Online Programmes (OL), the courses are delivered predominantly in the electronic learning mode through Electronic -Learning Materials (ELMs) provided in both print and electronic formats, supplemented with in-built self-assessment exercises.

In addition, Personal Contact Programmes (PCPs) are conducted virtually through online modes, including recorded lectures and virtual classroom sessions, in accordance with the prescribed academic schedule and regulatory provisions.

f. Instruction Media

Programme instruction shall be delivered through Electronic-Learning Materials supplemented by Personal Contact Programmes (PCPs). The PCPs shall be conducted through online platforms to provide essential opportunities for students to interact with faculty to clarify doubts, and receive hands-on training.

g. Student Support Service Systems

Learner support services are provided through multiple channels, including web-based platforms, online chat, and telephonic support. Learners are also provided access to academic counselling services at the respective Department on the University campus. In addition, access to library resources at the University and Department levels is ensured in accordance with institutional and regulatory provisions.

VI. Procedure for admissions, curriculum transaction and evaluation:

A. ELIGIBILITY FOR ADMISSION

Eligibility for Admission into Online Programmes (MCA - Master in Computer Applications) are as follows:

S No	Programme	Admission Requirements
1	**MCA - Computer Science and Engineering**	Minimum 50% aggregate in 10th or equivalent examination, Minimum 50% aggregate 10 +2 or equivalent from any recognized board and Minimum 50% aggregate in Passed BCA/Bachelor Degree in Computer Science Engineering or Equivalent Degree/Passed B.Sc/B.Com/B.A with Mathematics at 10+2 level or at Graduation level (with additional bridge courses as per the norms of the University).

- In addition to eligible Indian nationals as specified above, foreign nationals are also eligible for admission to the Online Learning (OL) programme, subject to the applicable UGC regulations, institutional norms, and prescribed eligibility criteria.

- The admission eligibility criteria for the Online Learning (OL) programme in MCA (Computer Science and Engineering) shall be the same as those prescribed for the MCA (Computer Science and Engineering) programme offered in the regular full-time (conventional) mode, in accordance with the applicable regulations and guidelines.

- The eligibility conditions for admission, including the class obtained, number of attempts in the qualifying examination, and physical fitness requirements, shall be as prescribed by the Institution from time to time, in accordance with applicable regulations and institutional

norms.

B. PROGRAM DELIVERY – METHOD & TOOLS

Digital study materials, including e-books / ELMs, shall be provided to learners at the commencement of the academic year.

A web-based learner portal shall be made available to provide access to the following academic and administrative services:

- Information pertaining to admission and enrolment processes
- Details of applicable fees and provisions for online fee payment
- Availability of the prospectus, relevant regulatory provisions, and detailed programme syllabus
- Academic and administrative notifications related to admissions, fees, examinations, and allied matters
- Details of individual courses, including progress tracking, internal evaluation scores, and outcomes
- Access to e-books and electronic versions of Self-Learning Materials (SLMs)
- Self-Assessment and practice tests (non-evaluative)
- Ongoing internal assessments and assignments
- Semester-wise online instructional sessions conducted through recorded lectures and virtual classrooms
- Online Discussion forums to facilitate peer-to-peer interaction
- Access to digital copies of grade sheets

C. DURATION AND STRUCTURE OF PROGRAMME

The minimum and maximum duration prescribed for the completion of the course shall be as follows:

Programme (OL)	Min. No. of Semesters	Max. No. of Semesters
MCA - Computer Science and Engineering	4	8

- The programme is structured to comprise the following components, in accordance with the prescribed curriculum:

a. Foundational and core courses
b. Programme -specific elective courses
c. Assignment components
d. Project component

- Instruction and assessment across all programme components shall be conducted exclusively in English.
- The curriculum and syllabi of the MCA - Computer Science and Engineering Online programme shall be as per the guidelines of the UGC / AICTE and approved by the Academic Council of this Institution.
- Each academic year shall span over one year, divided into two semesters. Continuous internal assessments and semester-end examinations shall be conducted in accordance with the approved Academic Calendar and Examination Schedule of the University.
- The curriculum and syllabi of the Online MCA (Computer Science and Engineering) programme shall be identical to those prescribed for the MCA (Computer Science and Engineering) programme offered in the regular full-time (conventional) mode, in accordance with the applicable regulations.
- The assessment framework and the mechanisms for monitoring the teaching–learning process for the Online MCA (Computer Science and Engineering) programme shall be the same as those prescribed for the MCA (Computer Science and Engineering) programme offered in the regular full-time (conventional) mode, in accordance with the

applicable regulations.

- The curriculum of MCA (Computer Science and Engineering) Online programmes shall follow the minimum prescribed credits required for the award of the degree as specified in the AICTE guidelines for this programme as given below:

Programme	Minimum Prescribed Credits
MCA - Computer Science and Engineering	91

D. DELIVERY OF ONLINE MATERIALS

In accordance with UGC guidelines, learning materials are delivered through the Learning Management System (LMS) adopting the four-quadrant approach. Unit-wise Continuous Internal Assessments (CIA) are designed in alignment with Bloom's Taxonomy–based assessment principles and are conducted online through the LMS as per the semester-wise requirements of the course.

Quadrant I: Interactive e-tutorial content supported by audio-visual, animation, and simulation resources.

Quadrant II: Textual notes in PDF format, along with video demonstrations, interactive chat sessions, web links, open-source simulators, case studies, and role-play

activities, shall be provided in accordance with the requirements of the respective course.

Quadrant III: Discussion and feedback forums and helpdesk-based doubt-clearing sessions shall be organized for each course unit, coordinated by the Programme/ Course Coordinator and conducted by the respective faculty members.

Quadrant IV: Self-assessment components, including MCQs, quizzes, assignments, unit-wise FAQs, and post-assessment discussion forums for clarification, shall be provided for each course unit.

Norms for Delivery of Courses in Online Mode

S. No	Credit value of the course	No. of Weeks	No. of Interactive Sessions		Hours of Study Material		Self-Study hours including Assessment etc.	Total Hours of Study (based on 30 hours per credit)
			Synchronous Online Counselling/ Webinars/ Interactive Live Lectures (1 hour per week)	Discussion Forum/ asynchronous Mentoring (2 hours per week)	e-Tutorial in hours	e-Content hours		
1	2 credits	6 weeks	6 hours	12 hours	10	10	22	60
2	4 credits	12 weeks	12 hours	24 hours	20	20	44	120
3	6 credits	14 weeks	14 hours	28 hours	30	30	66	180
4	8 credits	16 weeks	16 hours	32 hours	40	40	88	240

Review of Project Work		**Research work, Dissertation & Thesis**	
Component	**Marks**	**Component**	**Marks**
First Review	5	Presentation	15
Second Review	10	Content Originality	15
Third Review	15	Study/Model and Analysis Validity	15
		Findings & Conclusion	15
		Future Scope	10

Total	**30**		**70**

E. ASSESSMENTS AND EXAMINATIONS

- The assessment for programmes offered in the online mode shall comprise two components:

a. Formative Assessment (Continuous Internal Assessment) carrying a weightage of 30%

b. Summative Assessment (End Semester Examination) carrying a weightage of 70%

For project work the assessment pattern is as follows:

- End-Semester examinations in the online learning mode will be conducted using secure, technology-enabled online testing systems or through proctored examinations, ensuring transparency, credibility, and compliance with Commission guidelines.
- Appearing for semester-end theory examination for each course is mandatory and a student should secure a minimum of 50% marks in semester-end examination for the successful completion of the course.
- The components of continuous assessment for theory and practical courses shall be finalized in the first-class committee meeting.
- For the first attempt of the arrear theory examination, the internal assessment marks scored for a course during the first appearance shall be considered for grading along with the marks scored in the semester-end arrear examination. From the subsequent appearance onwards, full weightage shall be assigned to the marks scored in the semester-end examination to award grades and the internal assessment marks secured during the course of study shall not be considered.

The procedures followed for awarding marks and fixing grades for Online programmes such as MCA are the same as for programmes offered in the regular (conventional) mode.

F. PASSING, DECLARATION OF RESULTS AND GRADE SHEET

- All assessments for a course shall be made on an absolute marks basis. However, the Class Monitoring Committee without the student members shall meet within 5 days after the End Semester Examination and analyze the performance of students in all assessments of a course and award letter grades. The letter grades and the corresponding grade points for MCA are as follows:

PG Marks %	UG Marks %	GRADE	Grade Description	Grade Point
90-100	90-100	O	Outstanding	10
80-89	80-89	A+	Excellent	9
70-79	70-79	A	Very Good	8
60-69	60-69	B+	Good	7
50-59	50-59	B	Above Average	6
40-49	40-49	C	Average	5
*	35-39	P	Pass	4
<40	<35	F	Fail	0
		Ab	Absent	0
		Db	Debarred	0
* This grade is not applicable for PG Courses				

Credit point per course = Secured Grade Point x Course credit

SGPA =

$$\frac{c1g1 + c2g2 + c3g3 + \ldots\ldots}{c1 + c2 + c3 + \ldots\ldots}$$

CGPA =

$$\frac{c1g1 + c2g2 + c3g3 + \ldots\ldots}{c1 + c2 + c3 + \ldots\ldots}$$

Marks

Maximum CIA (Continuous Internal Assessment)	**30**
Maximum ESE (End Semester Examinations)	**70**

- A student who earns a minimum of five grade points, declared to have successfully completed the course. Such a course cannot be repeated by the student for improvement of grade.

- The results, after awarding of grades, shall be signed by the Chairman of the Class Committee and declared by the Controller of Examinations.

- Within one week from the date of declaration of result, a student can apply for revaluation of his / her semester end theory examination answer script for more courses, on payment of prescribed fee to the Controller of Examinations.

- After results are declared, grade report shall be issued to each student, which contains the following details:

a. List of courses along with course code enrolled during the semester / arrear courses, if any;
b. Marks secured (CIA, ESE & Total);
c. Passing Minimum;

d. Grade Point Semester Wise Grade Point Average (GPA) of all courses enrolled from first semester onwards, if completed for the semester

e. Result

- GPA is the ratio of the sum of the products of the number of credits of courses registered and the grade points courses, taken for all the courses, to the sum of the number of credits of all the courses in the semester.
- The formula for the conversion of CGPA to the equivalent percentage of marks is as follows:

$$\text{Grade Point Average (G.P.A.)} = \frac{\text{Sum of multiplication of grade points and the credits of the courses (Total Credit Points)}}{\text{Sum of the credits of the courses (passed) in a semester (No. of Credits)}}$$

* G.P.A. and No. of Credits will not be displayed for Students who have not cleared all the courses.

Percentage Equivalent of Marks = CGPA X 10

- For the purpose of classification, the CGPA shall be rounded to two decimal places. For the purpose of comparison of the performance of students and ranking, CGPA will be considered up to three decimal places.

G. POWER TO MODIFY THE REGULATION

Adamas University's Academic Council has the RIGHT and POWER TO MODIFY any of the above regulations from time to time as per the guidelines.

VII. Requirement of the laboratory support and Library resources:

Students registered in the Online programme and who desire to avail themselves of library facilities will be permitted to make use of the Exclusive Library earmarked for ODL programmes in the University and also they will be permitted to use the main University Library. Additional online resources are also provided via the Learning Management System, with access to eLibrary. Courses that require Laboratory support shall be provided with online virtual lab and lab simulation tools and software, to allow students to practice accordingly.

VIII. Requirement of the laboratory support and Library resources:

Students registered in the Online programme and who desire to avail themselves of library facilities will be permitted to make use of the Exclusive Library earmarked for ODL programmes in the University and also they will be permitted to use the main University Library. Additional online resources are also provided via the Learning Management System, with access to eLibrary.

Courses that require Laboratory support shall be provided with online virtual lab and lab simulation tools and software, to allow students to practice accordingly.

IX. Cost estimate of the programme and the provisions:

The Finance Committee will set aside budgetary provisions towards Programme Development, Programme Delivery, and Programme Maintenance. Once the programmes are operational, fee receipts from the program may be used to cover the same, as per the guidance of the Governing Board. The cost estimate is given in Indian Rupees (INR) for launching tow online programmes such as MCA:

1. Technology Infrastructure:	
Website Development:	300000
Learning Management System (LMS):	300000
Video Conferencing Tools:	75000
2. Content Creation:	
Curriculum Development:	75000
Multimedia Production:	150000
Copyrights and Licensing:	300000
3. Faculty and Staff:	
Instructional Designers:	3150000
Subject Matter Experts:	3450000
Technical Support:	450000
4. Marketing and Promotion:	
Digital Marketing:	225000
Branding and Design:	150000
5. Administration and Operations:	
Administrative Staff:	2400000
Legal and Regulatory Compliance:	300000
6. Infrastructure and Equipment:	
Servers and Hosting:	300000
Computers and Devices:	450000
7. Miscellaneous Expenses:	
Training and Development:	300000
Contingency Fund:	150000
Total	12525000

X. Quality assurance mechanism and expected program outcomes

a. Review Mechanism for Programme

b. Course Benchmarking

c. Mechanism for Monitoring Effectiveness.

Review Mechanism for Programme:

The University has established a robust quality assurance framework to ensure continuous review and enhancement of academic programmes offered through the online mode. The Centre for Internal Quality Assurance (CIQA) plays a pivotal role in initiating and implementing quality-related measures across teaching, learning, research, and administrative processes.

The CIQA undertakes initiatives related to research promotion, campus development, adoption of ICT-enabled teaching practices, focused academic support for research scholars through workshops, and coordination of Academic and Administrative Audits of the University.

At the end of every academic year, the University conducts a comprehensive assessment of the curriculum, courses, and academic programmes through structured student feedback.

The assessment covers key areas such as:

1. Reasons for selecting the course/programme
2. Availability and adequacy of departmental facilities
3. Quality and relevance of the syllabus
4. Effectiveness of internal assessment and evaluation processes
5. Quality of teaching, including regularity of classes, command over subject and language, student engagement, and timely completion of syllabus
6. Overall rating of the programme and the department

The feedback collected is analyzed and contributes to the academic quality radar prepared by the CIQA for continuous improvement.

Course Benchmarking:

To ensure parity and quality, online programmes are benchmarked against corresponding on-campus full-time programmes offered by the University. Students' learning outcomes, as

reflected through examinations and continuous assessments, are periodically compared to ascertain academic equivalence and quality standards.

Mechanism for Monitoring Effectiveness:

As part of the Quality Assurance Mechanism for Online and ODL programmes, the University shall establish a dedicated Centre for Internal Quality Assurance (CIQA) exclusively for programmes offered in the online mode. The CIQA shall function in accordance with the Quality Assurance Guidelines prescribed under the UGC ODL Regulations, covering aspects such as learning materials in multiple media, curriculum design, pedagogy, human resources, and learner support services.

The CIQA shall also conduct regular training and capacity-building programmes for teaching staff, administrative staff, and academic counsellors to enhance effectiveness in online programme delivery.

The University's Internal Quality Assurance Cell (IQAC) shall work in close coordination with the CIQA to develop and implement systematic feedback mechanisms. A 360-degree feedback system involving students, faculty, counsellors, and administrative staff shall be adopted. The feedback received shall be analysed, and appropriate corrective and enhancement measures shall be implemented on a continuous basis.

Further, after completion of the degree programme, alumni shall be periodically surveyed through structured email-based feedback and interviews to assess the impact of the programme on their professional growth and academic advancement. The insights gathered shall be used

to strengthen programme outcomes, align curricula with industry standards, and ensure continuous quality enhancement.

4. ANNEXURE - DETAILED SYLLABI

OLMCA101T	Introduction to Programming	L	T	P	C
Version 1.0	Contact Hours – 45 Hours	3	0	0	3
Pre-requisite/Exposure	Knowledge on programming logic				
Co-requisite	NIL				

Course Objectives:

- To motivate students to solve the problems in engineering using the concepts of procedural and object oriented programming.
- To enable students to apply OOP concepts in building solutions to real-world problems.
- To help the student to acquire knowledge of software development
- To enable students to debug simple C++ programs.
- To enable students to execute C++ programs successfully.

Course Outcomes:

On the completion of this course the student will be able to

- Discuss fundamentals of programming such as variables, conditional and iterative execution, methods, etc.
- Understand fundamentals of object-oriented programming in C++, including defining classes, invoking methods, using class libraries, etc.
- Explain important topics related to functions and pointers.
- Understand the scope of variables and utility of exception handling.
- Utilise the OOP knowledge to create, debug and run simple C++ programs.

Course Description:

This course introduces students to C and C++ programming language. Students will be taught the fundamentals of programming. These concepts are applicable to programming in any language. Topics covered include basic principles of programming using C++, algorithmic and procedural problem solving, program design and development, basic data types, control structures, functions, arrays, pointers, and introduction to classes for programmer-defined data types.

Course Content:

Unit-I	09 Lecture Hours
C Programming: Procedural programming, variables & data types, operators and conditional execution, understanding loops, arrays, types of arrays, functions, pointers, use of pointers with arrays, basic use of structures.	
Unit-II	**09 Lecture Hours**
Introduction to OOP: Need for OOP Paradigm, Procedural programming vs object oriented programming, object oriented concepts. **Class concept in OOP**: Difference between C structure and class, specifying a class, Defining member functions: inside and outside class, scope resolution operator, Array within a class, array of objects, Static data members and member functions, Object as function arguments, returning objects, Friend function, Constructor and destructor: Constructor, types of constructors: default, parameterized and copy constructor, constructor overloading, constructor with default parameter, dynamic initialisation of objects, destructor Operator overloading and Type Conversion: Defining operator overloading, overloading unary and binary operator, Data Conversion: Basic to User Defined, User defined to basic, Conversion from one user-defined to other.	
Unit-III	**09 Lecture Hours**
Functions: Main function, function prototyping, inline functions, reference variables, call by reference, Defaults arguments, function overloading, Math library functions. **Pointers**: memory allocation for objects, pointer to members, pointer to object, this pointer local classes.	
Unit-IV	**09 Lecture Hours**
Scope: Local and global scope, Inheritance and polymorphism: Base class, derived class, visibility modes, derivation and friendship, Types of inheritance, Containership, virtual function binding, pure virtual functions, Abstract class, **pointer to derived class.** **Console IO operations**: C++ stream classes, Unformatted IO operations, formatted IO operations, managing output with manipulators. **Exceptions**: Run time errors, exception handling using try, catch and throw, working with files: Classes for file stream operations, opening and closing files,File opening modes, file Pointers, Error handling during file operations, command line arguments, templates	
Unit-V	**09 Lecture Hours**
Problem solving with C++: Case study for problem solving on various real life systems like Bank, Library, Hospital, Hotel, Employee management system etc.	
Text Books: **5.** Bjrane Stroustrup, "C++ Programming language", Pearson education Asia **Reference Books:** **1.** Yashwant Kenetkar," Let us C++", Oxford University Press **2.** B.A. Forouzan and R.F. Gilberg, CompilerScience," A structured approach using C++" Cengage Learning, New Delhi.	

OLMCA101P	Introduction to Programming Lab	L	T	P	C
Version 1.0	Contact Hours – 45 Hours	0	0	3	2
Pre-requisite/Exposue	Knowledge on programming basics				
Co-requisite	NIL				

Course Objectives:

- To motivate students to solve the problems in engineering using the concepts of procedural and object oriented programming.
- To enable students to apply OOP concepts in building solutions to real-world problems.
- To help the student to acquire knowledge of software development
- To enable students to debug simple C++ programs.
- To enable students to execute C++ programs successfully.

Course Outcomes:

On the completion of this course the student will be able to

- CO1: Define classes, objects, members of a class and the relationships among them needed for a finding the solution to specific problem.
- CO2: Apply fundamentals of object-oriented programming in C++, including defining classes, invoking methods, using class libraries, etc.
- CO3: Explain important topics related to functions and pointers.
- CO4: Understand the scope of variables and utility of exception handling.
- CO5: Utilise the OOP knowledge to create, debug and run simple C++ programs.

Course Description:

This course introduces students to C and C++ programming language. Students will be taught the fundamentals of programming. These concepts are applicable to programming in any language. Topics covered include basic principles of programming using C++, algorithmic and procedural problem solving, program design and development, basic data types, control structures, functions, arrays, pointers, and introduction to classes for programmer-defined data types.

Course Content:

Unit-I	09 Lecture Hours
Write a C program to find factorial of a number. Write a C program to find roots of a quadratic equation. Write a C program to find whether the number is Armstrong.	
Unit-II	**09 Lecture Hours**

Write a C++ program that demonstrate the basic class program to get department, name and salary of an employee. Write a C++ program that to calculate area of circle, square, rectangle and triangle using switch case statements Write a C++ program to that accepts number from user and displays all the factors of that number.	
Unit-III	**09 Lecture Hours**
Write a C++ Program to swap two numbers using pointers. Write a C++ Program to add two numbers using pointers. Write a C++ Program to find length of string using pointer.	
Unit-IV	**09 Lecture Hours**
Write a C++ Program to show multiple inheritance Write a C++ Program to show multilevel inheritance Write a C++ Program to fetch the content of an existing file and display its contents.	
Unit-V	**09 Lecture Hours**
Write a C++ Program to read the name and roll numbers of students from keyboard and write them into a file and then display it. Define a class "Time" that contains following data members and member functions. Data members: 1. Hours 2. Minutes 3. Seconds Member Functions: 1. To get time from user 2. To display time on the screen 3. To calculate sum of two time objects. Write a C++ program that can read values of Time for two objects T1 and T2, calculate sum and display sum using defined member functions Create class "Sales" having following data members and member functions: Data Members: 1. Name of Salesman 2. Sales of Salesman Member functions to calculate commission 1. Commission is Rs. 10 per thousand if sales are at least Rs. 25000 or more 2. Commission is Rs. 5 otherwise. Write a C++ program that calculate and print name and sales of salesman.	
Text Books: **45.** Bjrane Stroustrup, "C++ Programming language" , Pearson education Asia **Reference Books:** **3.** Yashwant Kenetkar," Let us C++, Oxford University Press **4.** B.A. Forouzan and R.F. Gilberg, Compiler Science," A structured approach using C++" Cengage Learning, New Delhi.	

OLMCA102T	**Computer Organization & Architecture**	**L**	**T**	**P**	**C**
Version 1.0	**Contact Hours – 45 Hours**	**3**	**0**	**0**	**3**
Pre-requisite/Exposue	**Basic computer Skills**				
Co-requisite	--				

Course Content:

To study the basic organization and architecture of digital computers (CPU, memory, I/O, software). Discussions will include digital logic and microprogramming. Such knowledge leads to better understanding and utilization of digital computers, and can be used in the design and application of

computer systems or as foundation for more advanced computer-related studies

Course Outcomes:

On completion of this course, the students will be able to

- CO1. Define functional block of a computer and relate data representation.
- CO2. Explain and understand memory hierarchy design, memory access time formula, performance improvement techniques, and trade-offs.
- CO3. Illustrate pipelined execution, parallel processing and principles of scalable performances.
- CO4. Analyse the concepts of memory utilization in a computer system.
- CO5. Define the implementation of parallel processors and analyse the synchronization techniques

Catalogue Description:

The architecture of computer systems and associated software. Topics include addressing modes, interrupt systems, input/output systems, external memory systems, assemblers, loaders, multi programming, performance evaluation, and data security.

Course Content:

Unit-I	**09 Lecture Hours**
Functional blocks of a computer: CPU, memory, input-output subsystems, control unit. Instruction set architecture of a CPU – registers, instruction execution cycle, RTL interpretation of instructions, addressing modes, instruction set. Case study – instruction sets of some common CPUs. **Data representation:** signed number representation, fixed and floating-point representations, character representation. Computer arithmetic – integer addition and subtraction, ripple carry adder, carry look-ahead adder, etc. multiplication – shift-and-add, Booth multiplier, carry save multiplier, etc. Division restoring and non-restoring techniques, floating point arithmetic	
Unit-II	**09 Lecture Hours**
Operation in Peripheral devices and their characteristics: **Introduction** to x86 architecture. **CPU control unit design:** hardwired and micro-programmed design approaches, Case study – design of a simple hypothetical CPU. **Memory system design:** semiconductor memory technologies, memory organization. **Peripheral devices and their characteristics:** Input-output subsystems, I/O device interface, I/O transfers – program controlled, interrupt driven and DMA, privileged and non-privileged instructions, software interrupts and exceptions. Programs and processes – role of interrupts in process state transitions, I/O device interfaces – SCII, USB	
Unit-III	**09 Lecture Hours**

Inter-process pipelining: **Pipelining:** Basic concepts of pipelining, throughput and speedup, pipeline hazards. .	
Unit-IV	**09 Lecture Hours**
Memory and File organazation: **Memory organization:** Memory interleaving, concept of hierarchical memory organization, cache memory, cache size vs. block size, mapping functions, replacement algorithms, write policies	
Unit-V	**09 Lecture Hours**
Modern Case study in Parallel processor: **Parallel Processors:** Introduction to parallel processors, parallel computer models, principles of scalable performances, multiprocessors and multicomputer, message passing mechanism, scalable & Multithreaded dataflow architecture, Concurrent access to memory and cache coherency and synchronization techniques, GPU Processors. .	
Text Books: "Computer Organization and Design: The Hardware/Software Interface", 5th Edition by David A. Patterson and John L. Hennessy, Elsevier. "Computer Organization and Embedded Systems", 6th Edition by Carl Hamacher, McGraw Hill Higher Education. **Reference Books:** "Computer Architecture and Organization", 3rd Edition by John P. Hayes, WCB/McGraw-Hill	

"Computer Organization and Architecture: Designing for Performance", 10th Edition by William Stallings, Pearson Education. "Computer System Design and Architecture", 2nd Edition by Vincent P. Heuring and Harry F. Jordan, Pearson Education

OLMCA102P	**Computer Organization & Architecture Lab.**	**L**	**T**	**P**	**C**
Version 1.0	**Contact Hours – 30 Hours**	**0**	**0**	**3**	**2**
Pre-requisite/Exposure	**Fundamentals of Computer Architecture.**				
Co-requisite	**NIL**				

Course Objectives:

To study the basic organization and architecture of digital computers (CPU, memory, I/O, software). Discussions will include digital logic and microprogramming. Such knowledge leads to better

understanding and utilization of digital computers, and can be used in the design and application of computer systems or as foundation for more advanced computer-related studies.

Course Outcomes:

On completion of this course, the students will be able to

- CO1. Write VHDL & Verilog programs.
- CO2. Design Logic circuit & ALU
- CO3. Analyze logic circuit
- CO4. Implement memory management schemes and page replacement schemes.
- CO5. Simulate file allocation and organization techniques.

Catalogue Description:

The architecture of computer systems and associated software. Topics include addressing modes, interrupt systems, input/output systems, external memory systems, assemblers, loaders, multiprogramming, performance evaluation, and data security.

Course Content:

Implementation based on basic Logic Gates (AND, OR, NOT, NAND, NOR, XOR, XNOR)
Implementation based on Half adder and Full adder (using data flow, behavioral, structural modelling)
Implementation based on Half subtractor and Full subtractor (using data flow, behavioral, structural modelling)
Implementation based on Full adder using two half adders and Full subtractor using two half subtractors
Implementation based on multiplexer, demultiplexer, Encoder and Decoder
Implementation based on D Flip Flop, SR Flip Flop, JK Flip Flop, T Flip Flop
Implementation based on 4 Bit Register (using Structural modelling)
Implementation based on 4 Bit Comparator (using Behavioral modelling)
Implementation based on 4 Bit ALU

OLMCA103T	**Operating System**	**L**	**T**	**P**	**C**
Version 1.0	**Contact Hours – 45 Hours**	**3**	**0**	**0**	**3**
Pre-requisite/Exposure	**Data structures, Programming Languages, and Computer Architecture.**				
Co-requisite	**NIL**				

Course Objectives:

- To understand the students to study the basic principles and functionality of operating systems
- To provide the students to identify the concepts of CPU scheduling, concurrent processes, deadlock
- To allow the students to identify the significance of memory management and virtual memory.
- To enhance the skill of students to identify the disk scheduling, file systems, and device management.
- To understand the students to explain the performance trade-offs inherent in advance OS implementation.

Course Outcomes:

On the completion of this course the student will be able to

- CO1: Understand functionalities and features of Operating System
- CO2: Analyzing various scheduling algorithms and threading concepts to identify a suitable algorithm for a Given criteria.
- CO3: Assessing various solutions for critical Section problem. Applying deadlock avoidance principles and Check for the occurrence of deadlock.
- CO4: Explain different memory management techniques and its uses. Structuring an overview of file Systems and mass storage
- CO5: Understand the functionalities of modern operating system like Android, oxygen, Windows11 etc.

Course Description:

The course will begin with an overview of the structure of computer operating systems. The purpose of this course is to provide students basic knowledge of operating systems, difference between the kernel and user modes, concepts of application program interfaces, methods and implementations of interrupts. Students are introduced to the schedulers, policies, processes, threads, memory management, virtual memory, protection, access control, and authentication. Students learn system calls in different popular operating systems used in the industry. Particular emphasis will be given to three major OS subsystems: process management (processes, threads, CPU scheduling, synchronization, and deadlock), memory management (segmentation, paging, swapping), and file systems; and on modern operating system architecture.

Course Content:

Unit-I	**09 Lecture Hours**

Introduction to operating System: Introduction: Concept of Operating Systems, Operating Systems Objectives and Functions, Generations of Operating systems, Types of Operating Systems, OS Services, System Calls, Structure of an OS - Layered, Protection and Security, Case study on UNIX and WINDOWS Operating System.	
Unit-II	**09 Lecture Hours**
Introduction to Process and Process Scheduling : Process Management – Process concept- process scheduling, operations, Inter process communication. Multi Thread programming models. Process scheduling criteria and algorithms (FCFS, SJF, Priority, RR, Multilevel queue Scheduling), and their evaluation.	
Unit-III	**09 Lecture Hours**
Inter-process Communication and Deadlock : Process synchronization, the critical- section problem, Peterson's Solution, synchronization Hardware, semaphores, classic problems of synchronization, monitors, Producer Consumer problem, Readers & Writers Problem, Dining Philosopher Problem . Deadlocks: Definition, Necessary and sufficient conditions for Deadlock, Deadlock Prevention, and Deadlock Avoidance: Banker's algorithm, Deadlock detection and Recovery.	
Unit-IV	**09 Lecture Hours**
Memory and File Management : Memory Management : Swapping, contiguous memory allocation, paging, structure of the page table, segmentation, Virtual memory, demand paging, page-Replacement, algorithms, Allocation of Frames, Thrashing. File Management: Concept of File, Access methods, File types, File operation, Directory structure, File System structure, Allocation methods (contiguous, linked, indexed),Free-space management (bit vector, linked list, grouping), directory implementation (linear list, hash table), efficiency and performance.	
Unit-V	**09 Lecture Hours**
Modern OS Architectures : Case Study on: Android, Windows 11, Mac, oxygen OS and other contemporary Operating system.	
Text Books: Operating System Concepts- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 9th Edition, John Wiley publishers, 2012 Operating Systems' – Internal and Design Principles, Stallings, Sixth Edition, Pearson education, 2005. **Reference Books:** Operating System a Design Approach-Crowley, 3 rd Edition, Tata Mcgraw Hill, 2009. Operating systems- A Concept based Approach-D.M.Dhamdhere, 2nd Edition, Tata Mcgraw Hill, 2012 Modern Operating Systems, Andrew S Tanenbaum 3rd edition Prentice-Hall, Inc, 2008	

OLMCA103P	Operating System Lab	L	T	P	C
Version 1.0	Contact Hours – 45 Hours	0	0	3	2
Pre-requisite/Exposure	Data structures, Programming Languages, and Computer Architecture.				
Co-requisite	NIL				

Course Objectives:

- To introduce basic Unix commands, system call interface for process management, interprocess communication and I/O in Unix.
- To understand the students to study the basic principles and functionality of operating systems.
- To provide the students to identify the concepts of CPU scheduling, concurrent processes, deadlock
- To allow the students to identify the significance of memory management and virtual memory.
- To enhance the skill of students to identify the disk scheduling, file systems, and device management.

Course Outcomes:

On the completion of this course the student will be able to

- **CO1: Understand** and implement basic services and functionalities of the operating system using system calls and shell script.
- CO2: Analyze and simulate CPU Scheduling Algorithms like FCFS, Round Robin, SJF, and Priority.
- CO3: Assessing various solutions for critical Section problem. Applying deadlock avoidance principles and Check for the occurrence of deadlock.
- CO4: Implement memory management schemes and page replacement schemes.
- CO5: Simulate file allocation and organization techniques.

Course Description:

The goal of this course is to have students understand and appreciate the principles in the design and implementation of operating systems software. The course will cover the concepts of operating systems, process management, memory management, file systems. Experiments on process scheduling and other operating system duties will be conducted through simulation/implementation in the laboratory.

Unit-I	09 Lecture Hours

Linux Commands/Shell Programming: To study about the basics of Linux commands. Implementation of shell scripting using conditional/branching statement. Implementation of shell scripting using Loop statement. Implementation of shell scripting using Array. Implementation of shell scripting using String. Implementation of shell scripting using Function and recursion.	
Unit-II	**09 Lecture Hours**
Process Scheduling Algorithm: Simulate the following non-preemptive CPU scheduling algorithms to find turnaround time and waiting time. FCFS b) SJF c) Priority Simulate the following non-preemptive CPU scheduling algorithms to find turnaround time and waiting time. Shortest Remaining Time First b) Round Robin c) Priority Simulate multi-level queue scheduling algorithm considering the following scenario. All the processes in the system are divided into two categories – system processes and user processes. System processes are to be given higher priority than user processes. Use FCFS scheduling for the processes in each queue.	
Unit-III	**09 Lecture Hours**
Process Synchronization Problems /Deadlock: Simulate producer-consumer problem using semaphores. Simulate the concept of Dining-Philosophers problem. Simulate Bankers algorithm for the purpose of deadlock avoidance.	
Unit-IV	**09 Lecture Hours**
Memory Management Techniques: Simulate page replacement algorithms FIFO b) LRU c) Optimal Simulate disk scheduling algorithms FCFS b) SCAN c) C-SCAN Simulate selection partition algorithm a). Best Fit b). First Fit c). Worst Fit	
Unit-V	**09 Lecture Hours**
File Organization Techniques: simulate the following file organization techniques a) Single level directory b) Two level directory c) Hierarchical	

Text Books:
Operating System Concepts- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 9th Edition, John Wiley publishers, 2012

Operating Systems' – Internal and Design Principles, Stallings, Sixth Edition, Pearson education, 2005.

OLMCA104	**HSSM1-Business Communication**	**L**	**T**	**P**	**C**
Version 1.2	**Contact Hours – 45**	2	0	0	2
Pre-requisites/Exposure	**Understanding of significance of language**				
Co-requisites					

Course Objectives

- To enable students to understand the basic principle of communication including the flow of communication, verbal as well as non- verbal in context of the organization.
- To enable describe the various ways of employment communication as well as develop the understanding and skill of presentation
- To provide to the students the basic understanding of the verbal and non - verbal communication so that they understand the different aspects of spoken and written business communication.
- To understand and apply basic principles of critical thinking, problem solving, and technical proficiency in the development of exposition and argument

Course Outcomes

On completion of this course, the students will be able to:

- CO1: Explain the core principles of business communication, including verbal, non-verbal, and written formats, to develop effective communication strategies.
- CO2: Apply business communication techniques in professional settings, such as presentations, meetings, and negotiations, to convey information clearly and persuasively.
- CO3: Analyze various communication models and situations in business contexts, to identify barriers to effective communication and propose solutions.
- CO4: Design communication plans tailored to specific business scenarios, incorporating feedback and utilizing appropriate channels to achieve strategic goals.
- CO5: Evaluate the effectiveness of business communication practices by using feedback mechanisms and communication analytics, to enhance clarity, audience engagement, and organizational impact.

Course Description

Communication skill in a manager is one of the important skills, which a manager must possess to perform his/her role(s) effectively in an organization. Since he/she deals with employees, and with customers outside the organization, it is important that in an organization he should be well equipped in terms of different aspects of business communication. The course therefore covers all constituents, which will make a manager's job easy to handle.

Classroom activities involving lectures, discussions and case studies analysis (topped up with role-play) will be designed to encourage students to actually get involved, absorb and assimilate inputs. These activities will also be supplemented by group discussions, group presentations, cooperative group solving problems, analysis of video cases and debates. Class participation is a fundamental aspect of this course. Students will be encouraged to actively take part in all group activities and to give an oral group presentation. Students will be expected to interact with media resources, such as, web sites, videos, DVDs, and newspapers etc.

Course Content

UNIT 1- [5L]

Conceptual Issues in Communication, Principles of Communication, Process of Communication, Communication Networks in an Organization, Verbal and Non Verbal Communication.

UNIT II [8L] Barriers and Aids to Communication, The 7 C's and the 4 S's of Communication, Talk Tactics : Private and Public Speaking. Critical Reasoning : Theory and Caselets. The Framing of Arguments to Persuade ,Convince and Negotiate. Principles of Deductive and Inductive Principles in understanding Assumptions. Drawing Conclusions. Case Study Analysis in terms of Business and Current Affairs.

UNIT III [8L] Listening Process, Difference between Listening and Hearing.Deterrents to the Listening Process, The Positive Connotations of Good Listening, Case Study Analysis , Non Verbal Communication, Non Verbal Signifiers and Communication, Body Language and

Global Business Etiquette, Cross Cultural Communication, Case Study and Dramatic Practical on the above.

UNIT I V [8L] Written Communication, The 7 Cs of Written Communication, The First Draft and the Craft of Editing a write up. Memos, Letters, Emails, Net Etiquette and other Business Correspondence. Presentations: Preparing it and making an effective delivery. Practical Exercises.

UNIT V [8L] Negotiating Skills for Business. Telephone Culture and Video Conferencing. Group Discussion: Basics and Practice, Personal Interview: C.V. Format. Frequently Asked Questions and Mock Interviews.

OLMCA105T	**Numerical & Statistical Methods**	**L**	**T**	**P**	**C**
Version 1.0	**Contact Hour - 45**	**3**	**0**	**0**	**3**
Pre-requisites/Exposure	**Basic math Skills**				
Co-requisites	**--**				

Course Objectives:

To provide students with knowledge in different computational errors occurred in numerical calculation. It can be minimized using different numerical techniques and, analyses and interpret statistical data using several statistical tools.

Course Outcomes:

On completion of this course, the students will be able to

- Find skewness, kurtosis, correlation coefficient and fit linear curve with the available set of data.
- Explain Baye's theorem for certainty of events and several probability distributions.
- Apply test of hypothesis to test mean, variance and different attributes for a population.
- Find real roots of algebraic and transcendental equations using Bisection method, Regula-Falsi method and Newton Raphson method.
- Utilize Euler method, Runge-Kutta method to obtain the solution to ordinary differential equations with initial conditions and, direct and iterative methods in simultaneous linear

equation.

- Explain Numerical integration to obtain the value of an integral with finite limit and, finite differences to obtain interpolating and extrapolation values.

Catalogue Description:

This course introduces basic concepts in programming language to solve numerical and statistical problems. All the lectures will be devoted on discussions of basic theories and advanced topics, focusing on practical implementation of knowledge. Classes will be conducted by lecture as well as power point presentation, audio visual virtual lab session. The tutorials will familiarize the students with practical problem-solving techniques led by the course coordinator. Students will strongly grab the basic concepts of the subject via exercise and discussions with the coordinator.

Course Content:

Unit-I	**09 Lecture Hours**
Introduction to stastics:	

Statistics: Definition, scope and limitation, presentation of data, diagrammatic and graphical representation of data, measures of central tendency, mean, median and mode, geometric and harmonic mean and their limitations, Measure of variations, Range, Quartile, Variance, Standard deviation, Skegness, moment and Kurtosis. **Correlation and Regression:** Introduction to Correlation analysis, Karl Pearson correlation coefficient, Rank Correlation, Regression Analysis, Fitting Straight Lines, Method of least square, regression coefficients, properties of regression coefficients and applications	
Unit-II	**09 Lecture Hours**
Introduction to Probability Distributions : **Probability:** Introduction, Probability of an event, additive rule & multiplication rule, conditional probability Bayes' rule and applications. **Probability Distributions:** Random variable, discrete and continuous probability distribution, Mathematical expectation, Variance of a random variable, Binomial, Hyper-geometric, Poisson distribution, Uniform, Normal, Exponential Distribution. **Test of hypothesis:** Introduction, null hypothesis and alternative hypothesis, type I and type II errors, one and two tailed tests, test on a single mean when variance is known .	
Unit-III	**09 Lecture Hours**
Operation in Numerical solution of algebraic and transcendental equations : **Numerical solution of algebraic and transcendental equations:** Introduction, Concept of Errors, Bisection Method, False Position Method, Secant Method, Newton-Raphson Method, Successive Approximation Method, Discussion of Convergence, **Solution of simultaneous linear equations:** Gauss elimination method, pivoting, ill conditioned equations, Gauss Seidel and Gauss Jacobi iterative methods	
Unit-IV	**09 Lecture Hours**
Finite difference analysis : **Finite difference analysis:** Interpolation and Extrapolation, Calculus of difference, Newton's Forward Interpolation Formula and Backward Interpolation Formula, Lagrange's method, Newton's divided difference formula, Inverse Interpolation and its applications. vector, linked list, grouping), directory implementation (linear list, hash table), efficiency and performance.	
Unit-V	**09 Lecture Hours**
Case study in Numerical differentiation and integration: Numerical differentiation and integration: Differentiation formulae based on polynomial fit, integration by trapezoidal and Simpson's one-third rules.Solution of simultaneous linear equations and ordinary differential equations: Euler methods,	

OLMCA105P	Numerical & Statistical Methods Lab	L	T	P	C
Version 1.0	Contact Hour -45	0	0	3	2
Pre-requisites/Exposure	Basic math Skills				
Co-requisites	--				

Course Objectives:

To provide students with computing knowledge in Numerical and Statistical problems using programming language.

Course Outcomes:

On completion of this course, the students will be able to

- CO1. Find real roots of algebraic and transcendental equations using Bisection method, Regula-Falsi method and Newton Raphson method.
- CO2. Solve system of linear equations using direct method and iteration method.
- CO3. Illustrate several methods of finite differences to obtain interpolating and extrapolating values from a set of data using.
- CO4. Classify Trapezoidal rule and Simpson's 1/3rd rule to obtain the value of an integral with finite limit.
- CO5. Utilize Euler method, Runge-Kutta to obtain the solution to ordinary differential equations with initial conditions.
- CO6. Find mean, variance, correlation coefficient and fit linear curve with the available set of data.

Course Description:

This course introduces basic concepts in programming language to solve numerical and statistical problems. All the lectures will be devoted on discussions of basic theories and advanced topics, focusing on practical implementation of knowledge. Classes will be conducted by lecture as well as power point presentation, audio visual virtual lab session. The tutorials will familiarize the students with practical problem-solving techniques led by the course coordinator. Students will strongly grab the basic concepts of the subject via exercise and discussions with the coordinator.

Course Content:

List of experiments

Write and execute C-code for the following programs:

	Name of the experiment
1	To find real roots of algebraic and transcendental equations using Bisection method.
2	To find real roots of algebraic and transcendental equations using Regula-Falsi method.
3	To find real roots of algebraic and transcendental equations using Newton Raphson
	method.
4	To find solution of system of simultaneous algebraic equations using Gauss elimination method.
5	To find solution of system of simultaneous algebraic equations using Gauss-Seidal iterative method.
6	To find interpolating values using Newton's Forward interpolation formula.
7	To find interpolating values using Newton's Backward interpolation formula.
8	To find interpolating values using Lagrange's interpolation formula.
9	To evaluate integral value of a given function using Trapezoidal rule for numerical integration
10	To evaluate integral value of a given function using Simpson's 1/3rd rule for numerical integration
11	To find numerical Solution of ordinary differential equation using Euler's method.
12	To find numerical Solution of ordinary differential equation using 4th order Runge Kutta method.
13	To calculate mean and variance from a statistical data set.
14	To calculate Correlation coefficient.
15	To fit a linear curve using available data set.

OLMCA106T	**Software Engineering**	**L**	**T**	**P**	**C**
Version 1.0	**Contact hour-45**	**3**	**0**	**0**	**3**
Pre-requisites/Exposure	**Software/Hardware evolution at basic level**				
Co-requisites	**--**				

Course Objectives:

6. To help the student to acquire knowledge of software evolution process.
7. To enable students modelling software project with appropriate metric and precision at workplace.
8. To give the students a perspective to software design process variables by exposing them to software specification document; and also, to enrich their software testing ability.
9. To enable students, acquire testing and quality assessment of model required for their profession.

Course Outcomes:

On completion of this course, the students will be able to

CO1. **Understand** the impact of software engineering.
CO2. **Communicate** with proper software model paradigm to pupils.
CO3. **Enhancement** of software metric engineering application in industry.
CO4. **Compare** Effectively testing and maintenance of software project.
CO5. **Classify** software metric analysis for an effective model.

Catalogue Description:

There is a growing need for talented software developers across every industry. As technology advances, the ability to build quality software while considering design, development, security, and maintenance is sought after amongst all kinds of companies, from finance and banking to healthcare and national security.
Software Engineering applies the knowledge and theoretical understanding gained through computer science to building high-quality software products. As a maturing discipline, software is becoming more and more important in our everyday lives. Our software development and engineering professional program is Pace University's response to the tremendous growth of the software development industry.

Course Content:

Unit I: **9 lecture hours**

Introduction to Component based development:

Software - Evolving role of it, a crisis on the Horizon and its Myths, Software process models: linear sequential model, prototyping model, RAD model, Evolutionary model, Formal methods model, Component based development, fourth generation techniques, Software development and requirement analysis using Agile, Scrum framework.

Unit II: *10 lecture hours*

Introduction to Software Process and project metrics:

Management spectrum, people, problem, process, project and few Critical approach,

Software Process and project metrics: Measure, Metrics and Indicators, Process and Project Domain related metrics, Software Measurement, Reconciling of Different, Metrics Approaches, Software quality metrics, Validation management,

Software project planning: Observations on estimation, Objectives of Project planning.

Unit III: **8 lecture hours**

Analysis to Risk management:

Resources: Software project estimation, Empirical models for estimation, automated estimation tools, Risk management and Software risks: Identification, Risk projection, safety risks and hazards; RMMM plans, Risk management

Unit IV: **9 lecture hours**

Analysis to Software quality assurance:

Project scheduling and tracking: Definition of task set and task network, Scheduling, earned value analysis, Tracking of Errors, Project planning, **Software quality assurance:** Concepts of Software Quality, Quality movement, Review of software quality assurance, Software reliability, Software quality metrics (MTTF, MTTR, MTBF ETC.)

Unit V: **10 lecture hours**

Case study analysis in Software design, Software testing techniques:

S**oftware configuration management:** Object identification in software configuration, Configuring audit-SCM standards, **Analysis concepts and principles:** Requirement analysis, Software prototyping, Specification Review Analysis modeling, Data modeling, Functional modeling, Behavioral modeling, **Software design, Software testing techniques:** White box and black box testing, Software testing strategies - Unit testing, Integrating testing, System testing.

Text Books:

10. Software Engineering: A practitioner's approach, 8th Edition, Roger S. Pressman, McGraw Hill
11. An integrated approach to Software Engineering, Springer/Narosa Edition, PankajJalote.

Reference Books:

12. Fundamentals of Software Engineering, 4th Edition, Rajib Mall, Prentice Hall, India.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Examination Scheme:

Components	Class Assessment	Mid Term	End Term
Weightage (%)	30	20	50

Model Question Paper

ADAMAS UNIVERSITY

SCHOOL OF ENGINEERING AND TECHNOLOGY END-SEMESTER EXAMINATION: JULY 2020

Name of the Program: MCA
Semester: I
Stream: CSE
PAPER TITLE: Software Engineering
PAPER CODE: OLMCA106T
Maximum Marks: 50
Time duration: 3 hours
Total No of questions: 12
Total No of Pages: 02

Instruction for the Candidate:

6. At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, and Date of Exam.
7. All parts of a Question should be answered consecutively. Each Answer should start from a fresh page.
8. Assumptions made if any, should be stated clearly at the beginning of your answer.

Section A (Answer All the Questions) (5 x 2 = 10)			
1.	**List** the steps involved in Software development life cycle? Write a note on it.	**U**	**CO1**
2.	**Enumerate** the basic elements of Software requirement specification.	**U**	**CO2**
3.	**Define** Data coupling.	**R**	**CO3**
4.	**What** is Software configuration management?	**R**	**CO4**
5.	**Give** the principles of functional cohesion.	**U**	**CO4**
	SECTION B (Attempt any **Three Questions) (3 x 5 = 15)**		
6.	**Describe** the stages of evolutionary model?	**U**	**CO1**
7.	**Examine** the essential phases of iterative water fall model then what is the expected performance over traditional water fall model?	**Ap**	**CO2**
8.	**Elucidate** the Black box testing and White box testing with suitable example.	**Ap**	**CO3**
9.	**Explain** Scrum and agile application briefly explain it with proper example?	**U**	**CO4 /CO2**
	SECTION C (Answer Any Two Questions) (2 x 12.5 = 25)		
10.	**Explain** in detail about V-model from end user point of view how it is useful in project design.	**U**	**CO4**
11.	**Write** a Project estimation technique and estimation issues in project progress line.? Explain with a Case Study	**U**	**CO4**
12.	**Distinguish** features of the factors i) Product metric, ii) Function point metric?	**U**	**CO5**

OLMCA201	**Switching Circuit and Logic Design**	**L**	**T**	**P**	**C**
Version 1.0	**Contact Hour -45**				
Pre-requisites/Exposure	**Basic Electronics, Modern Physics**				
Co-requisites	**Digital Electronics**	**3**	**0**	**0**	**3**

Course Objectives:

- To introduce an overview of logic families.
- To develop students for building k-map.
- To provide the students a detailed analysis of sequential circuit.
- To introduce the students to formalize with ASM chart.

Course Outcomes:

On the completion of this course the student will be able to

- Understand and construct the basic design principles of logic gate.
- Understand the different fabrication techniques used in Bipolar, CMOS and PLA.
- Formalize with mealy and Moore machine.
- Construct ROM design.

Course Description:

The world of electronics is a lot easier to understand if we start by dividing it into two distinct categories: the "analog" world and the "digital" world. The analog world generally refers to any natural phenomenon that varies its own properties over a period of time. Take the outside temperature, for example. We notice that it changes rather slowly throughout the day, and at any instant we can measure how hot or cold it really is by using a simple thermometer.
The same changing properties can be observed, measured, and recorded in other natural phenomenon such as barometric pressure, wind speed, solar radiation, etc. If you were to record and graph each of the above events over a 24 hour period, you would notice one similar characteristic: the physical properties of each phenomenon change over time.

Course Content:

Unit-I	**7 Lecture Hours**
Switching Circuits: Logic families: TTL, nMOS, CMOS, dynamic CMOS and pass transistor logic (PTL) circuits, inverters and other logic gates, area, power and delay characteristics, concepts of fan-in, fan-out and noise margin.	
Unit-II	**10 Lecture Hours**
Switching theory: Switching algebra, logic gates, switching functions, truth tables and switching expressions, minimization of completely and incompletely specified switching functions, Karnaugh map and Quine-McCluskey method, multiple output minimization, representation and manipulation of functions using BDD's, two-level and multi-level logic circuit synthesis.	
Unit-III	**7 Lecture Hours**
Combinational logic circuits: Realization of Boolean functions using NAND/NOR gates, Decoders, multiplexers. logic design using ROMs, PLAs and FPGAs. Case studies, fault diagnosis of combinational circuits	
Unit-IV	**15 Lecture Hours**

Sequential circuits: Clocks, flip-flops, latches, counters and shift registers, finite-state machine model, Mealy and Moore machines, synthesis of synchronous sequential circuits, Conversion of Mealy m/c to Moore m/c and vice-versa, minimization and state assignment, Incompletely specified m/c's, asynchronous sequential circuit synthesis.	
Unit-V	**6 Lecture Hours**
ASM charts: Representation of sequential circuits using ASM charts, synthesis of output and next state functions, data path control path partition-based design.	
Text Books: H. Taub and D. Schilling, Digital Integrated Electronics, McGraw-Hill. **Reference Books:** Z. Kohavi, Switching and Finite Automata Theory, Tata McGraw-Hill Randy H. Katz and Gaetano Borriello, Contemporary Logic Design, Prentice Hall of India	

OLMCA202T	**Object Oriented Programming with Java**	**L**	**T**	**P**	**C**
Version 1.0	**Contact Hours -45**	**3**	**0**	**0**	**3**
Pre-requisites/Exposure	**Basic concept of programming**				
Co-requisites	**--**				

Course Objectives:

Students will be motivated to solve the problems in engineering using the concepts of object-oriented programming.

Course Outcomes:

On completion of this course, the students will be able to

- CO1. Define Abstraction in all forms and in a holistic way
- CO2. Illustrate object oriented modelling techniques like classes and Instances modelling techniques
- CO3. Solve programs using standard design patterns
- CO4. Interpret fundamentals of object-oriented programming in Java, including defining Classes, invoking methods, using class libraries, etc.
- CO5. Construct programming solutions with exception handling and multi-threading concept CO6. Solve GUI program with proper event handling techniques

Catalog Description:

This course investigates object-oriented methods including object-oriented programming methodologies and techniques. Current methodology is emphasized. The use of object-oriented features such as encapsulation, information hiding, inheritance and polymorphism is reinforced by class assignments and programming exercises. The importance of multi-threading and exception handling is introduced in this course.

Course Content:

Unit I: 09 lecture hours Introduction

to oop concepts:

OOP Concepts - Data Abstraction, Encapsulation, Inheritance, Benefits of Inheritance, Polymorphism, Classes and Objects, Procedural and OOP Paradigms. Introduction To Java, Data Types, Variables & Constants, Scope & Life Time Of Variables, Precedence Of Operator, Expressions, Type Casting, Enumerated Types, Block Scope, Control Flow, Conditional Statements, Loops, Break & Continue Statements, Arrays, Console Input/Output, Formatting Output, Constructors Methods, Parameter Passing, Static Fields & Methods, Access Control, "This" Reference, Method Overloading, Recursion, Garbage Collection, Building Strings, String Class.

Unit II: 09 lecture hours

Idea on Inheritance and polymorphism Concepts:
Inheritance - Hierarchical Inheritance: Super And Sub Classes, Member Accessing Rules, Super Keyword, And Preventing Inheritance: Final Classes And Methods, Object Class And Its Methods.

Polymorphism - Dynamic Binding, Method Overriding, Abstract Classes and Methods
Interfaces - Interfaces and Abstract Classes, Definition, Implementation, Accessing Implementations by Interface References, Extending Interfaces.

Inner Classes - Usage, Local, Anonymous and Static Inner Classes, Examples.

Packages - Definition, Creation And Accessing A Package, Understanding CLASSPATH,

Importing Packages.

Unit III: 09 lecture hours

Brief operation in Exception Handling Concepts:

Exception Handling - Dealing With Errors, Advantages Of Exception Handling, The Classification - Exception Hierarchy, Checked And Unchecked Exceptions, Try, Catch, Throw, Throws And Finally, Exceptions-Throwing, Exception Specification, Built In Exceptions, Creating Exception Sub Classes.

Multithreading - Difference Between Multiple Processes And Multiple Threads, Thread States, Creating And Interrupting Threads, Thread Priorities, Synchronizing Threads, Inter-Thread Communication, Procedure Consumer Pattern.

Unit IV: 09 lecture hours

Brief operation in Connecting To Database:

Collection Framework - Introduction, Generics and Common Use Of Collection Classes,

Array List, Vector, Hash Table, Stack, Enumeration, Iterator, String Tokenizer, Random,

Scanner, Calendars And Properties.

Files - Streams - Byte Streams, Character Streams, Text Input/Output, Binary Input/Output, Random Access of File Operations, File Management.

Connecting To Database – JDBC / ODBC Type 1 To 4 Drivers, Connection And Handling Databases With JDBC.

Unit V: 09 lecture hours

Case study in GUI Programming:

GUI Programming - The AWT Class Hierarchy, Introduction To Swing, Swing Vs, AWT, Hierarchy Of Swing Components, Containers - Jframe, Japplet, Jdialog, Jpanel, Overview Of Swing Components: Jbutton, Jlabel, Jtextfield, Jtextarea, Swing Applications, Layout Management - Types - Border, Grid And Flow

Event Handling - Events, Sources, Classes, Listeners, Event Sources And Listeners, Delegation Event Model, Examples. Handling Mouse Events, Adapter Classes.

Applets - Inheritance Hierarchy For Applets, Differences Between Applets And Applications, Life Cycle, Passing Parameters To Applets, Applet Security Issues.

Text Books:

74. “Java Fundamentals - A Comprehensive Introduction”, Illustrated Edition By Daleskrien, Herbert Schildt, Mcgraw-Hill Education.

Reference Books:

1.“Java For Programmers”, 2nd Edition By Paul Deitel And Harvey Deitel, Pearson Education.
“Thinking In Java”, Low Price Edition By Bruce Eckel, Pearson Education

OLMCA202P	Object Oriented Programming with Java Lab	L	T	P	C
Version 1.0	Contact Hours -30	0	0	3	2
Pre-requisites/Exposure	Set Theory, Knowledge of programming language.				
Co-requisites	--				

Course Objectives:

To understand how to design, implement, test, debug, and document programs that use basic data types and computation, simple I/O, conditional and control structures, string handling, functions and object oriented approaches.

Course Outcomes:

On completion of this course, the students will be able to

- CO1. **Define** classes, objects, members of a class and the relationships among them needed for a finding the solution to specific problem.
- CO2. **Illustrate** object oriented modelling techniques like classes and Instances modelling techniques
- CO3. **Solve** programs using standard design patterns.
- CO4. **Interpret** fundamentals of object-oriented programming in Java, including defining
- Classes, invoking methods, using class libraries, etc.
- CO5. **Construct** programming solutions with exception handling and multi-threading concept
- CO6. **Solve** GUI program with proper event handling techniques.

Catalogue Description:

This course investigates object-oriented methods including object-oriented programming methodologies and techniques. Current methodology is emphasized. The use of object-oriented features such as encapsulation, information hiding, inheritance and polymorphism is reinforced by class assignments and programming exercises. The importance of multi-threading and exception handling is introduced in this course.

Course Content:

List of Programs:

1. Assignments based on class, constructor.
2. Assignments based on overloading.
3. Assignments based on inheritance, overriding.
4. Assignments based on wrapper class, arrays.
5. Assignments based on developing interfaces- multiple inheritances, extending interfaces
6. Assignments based on creating and accessing packages
7. Assignments based on multithreaded programming
8. Assignments based on applet programming
9. Design a applet in Realtime web page design
10. Apply the concept in multi-threading
11. Apply the analysis in Java application development 108. Design a case study in android application.

Text Books:

1.“Java Fundamentals - A Comprehensive Introduction”, Illustrated Edition By Daleskrien, Herbert Schildt, Mcgraw-Hill Education.

Reference Books:

1.“Java For Programmers”, 2nd Edition By Paul Deitel And Harvey Deitel, PearsonEducation.
2.“Thinking In Java”, Low Price Edition By Bruce Eckel, Pearson Education

OLMCA203T	**Data Structures**	**L**	**T**	**P**	**C**
Version 1.0	**Contact Hours – 45 Hours**	**3**	**0**	**0**	**3**
Pre-requisite/Exposure	--				
Co-requisite	--				

Course Objectives:

- To make students familiar with data structure
- To enable students to know and conceptualize stack, queue, linked list concept
- To enhance the skill of solving data problems over real time.

Course Outcomes:

On the completion of this course, the student will be able to

- **CO1: Define** the concept of Dynamic memory management, data types, and algorithms.
- **CO2: Illustrate** advantages and disadvantages of specific algorithms and data structures.
- **CO3: Solve** bugs in program, recognize needed basic operations with data structures.
- **CO4: Interpret** algorithms and data structures in terms of time and memory complexity of basic operations.
- **CO5: Compare** the computational efficiency of the principal algorithms for sorting, searching, and hashing.

Course Description:

Study of advanced programming topics focused on logical structures of data as well as the design, implementation and analysis of algorithms operating on these structures. Students will gain the fundamental concept of data structures and to emphasize the importance of data structures in developing and implementing efficient algorithms.

Course Content:

Unit-I: Introduction		**10 Lecture Hours**
Unit Heading: Concepts on Pointer, Dynamic Memory allocation, Structure, Recursion. Basic Terminologies: Elementary Data Organizations, Data Structure Operations: insertion, deletion, traversal etc.; Analysis of an Algorithm, Asymptotic Notations, Time-Space trade off. Arrays, 1D array, Operations on Array, 2D Array, Memory Representation of 2D Array, Operations on 2D Array, Searching, Linear Search, Binary Search		
Unit-II: Stacks and Queues		**8 Lecture Hours**
Unit Heading: ADT Stack and its operations, evaluation – Queue, Circular Queue, Priority Queue; Operations on ea	Applications of Stacks algorithms and . ADT queue, Types	: Expression Conversion and of Queue: Simple thms and their
Unit-III: Linked List		**10 Lecture Hours**
Unit Heading: Linked lists: Single, Doubly, Circular and Circular Doubly. Representation in memory, Algorithms of several operations : Traversing, Searching, Insertion into, Deletion from linked list (For all		

four kinds); Linked representation of Stack and Queue. Polynomial representation using Linked List.	
Unit-IV: Trees and Graphs	**12 Lecture Hours**
Unit Heading: Tree: Basic Tree Terminologies, Different types of Trees: Binary Tree, Threaded Binary Tree, Binary Search Tree, AVL Tree; Tree operations on each of the trees and their algorithms with complexity analysis. Applications of Binary Trees. Threaded Binary Tree. B Tree, B+ Tree: definitions, algorithms and analysis, Minimal Spanning Tree. **Graphs:** Basic Terminologies and Representations, Graph search and traversal algorithms and complexity analysis.	
Unit-V: Sorting and Hashing	**10 Lecture Hours**
Unit Heading: Objective and properties of different sorting algorithms: Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort; Performance and Comparison among all the methods, Hashing, Hash Functions, Collision, Collision Resolution Techniques.	
Text Books: Fundamentals of Data Structures, Illustrated Edition by Ellis Horowitz, SartajSahni and Computer Science Press.. Classic Data Structure, Debashis Samanta, PHI **Reference Books:** Data Structure Using C, Reema Thareja, Oxford University Press Algorithms, Data Structures, and Problem Solving with C++, Illustrated Edition by Mark Allen Weiss, Addison-Wesley Publishing Company.	

OLMCA203P	**Data Structures Lab**	**L**	**T**	**P**	**C**
Version 1.0	**Contact Hours – 45 Hours**	**0**	**0**	**3**	**2**
Pre-requisite/Exposure	**Concept in C-Programming**				
Co-requisite	**NIL**				

Course Objectives:

- To teach programming (with an emphasis on problem solving)
- To introduce elementary data structures
- To allow student at a rudimentary level, be able to prove correctness (loop invariants, conditioning, etc).

Course Outcomes:

On the completion of this course the student will be able to

- CO1 : Explain asymptotic performance of the algorithms.
- CO2: Illustrate Linear data structures and their applications such as Stacks, Queues and Linked Lists
- CO3: Solve and understand Non-Linear Data Structures and their Applications such as Trees and Graphs
- CO4: Interpret searching and sorting algorithms

Course Description:

Data Structures (also called Data Structures and Algorithms in some places) is a core course in all computer science undergraduate curricula. The course is the basis for understanding several data structures and also algorithms that operate on them. The course forms the foundation for almost all computer science subjects: compilers, operating systems, databases, AI and software engineering.

Course Content:

Unit-I: Array	**9 Lecture Hours**
Write a program in C to Search an element into a 1D array. Write a program in C to sea into a 1D array using Binary Search.	

Write a program in C to insert an element into a 1D array. Write a program in C to delete an element from a 1D array. Write a program in C to add two given matrices. Write a program in C to multiply two given matrices. Write a program in C to find the transpose of a given matrix.	
Unit-II: Stacks and Queues	**8 Lecture Hours**
Write a program in C to implement Stack using Array . Write a program in C to implement a Qu n Infix Expression to an g Stack. Write a program in C to implement a Circular Queue .	
Unit-III: Linked List	**12 Lecture Hours**
Write a program in C to insert an element at the beginning into a Single Linked List Write a program in C to insert an element at the end into a Single Linked List Write a program in C to insert an element after a given element into a Single Linked List Write a program in C to insert an element at the beginning into a circular Linked List Write a program in C to insert an element at the end into a circular Linked List Write a program in C to insert an element at the beginning into a Doubly Linked List Write a program in C to insert an element at the end into a Doubly Linked List Write a program in C to insert an element after a given node into a Doubly Linked List Write a program in C to delete an element from a Single Linked List Write a program in C to delete an element from a Circular Linked List 11.Write a program in C to delete an element from a Doubly Linked List	
Unit-IV: Trees and Graphs	**11 Lecture Hours**
Write a program in C to implement a tree Write a program in C to implement a Binary Search Tree. Write a program in C to implement Minimal Spanning Tree Using Kruskal's Algorithm. Write a program in C to implement Minimal Spanning Tree using Prim's Algorithm. Write a program in C to implement Depth First Search 6. Write a program in C to implement Breadth First Search.	
Unit-V: Sorting	**5 Lecture Hours**
Write a program in C to implement Bubble Sort . Write a program in C to im C to implement Insertion Sor Write a program in C to im Write a program in C to implement Heap Sort.	

Text Books:
Chuck Lam, Hadoop in Action, Manning Publications,2010.
David Loshin, "Big Data Analytics: From Strategic Planning to Enterprise Integration with Tools, Techniques, NoSQL, and Graph", 2013.

Reference Books:
Big Data and Analytics by Seema Acharya, Subhashini Chellapan
Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses by Michael Minelli ,Michele Chambers , Ambiga Dhiraj

OLMCA204T	**Database Management System**	**L**	**T**	**P**	**C**
Version 1.0	**Contact Hours -45**	**3**	**0**	**0**	**3**
Pre-requisites/Exposure	**Set Theory, Knowledge of programming language.**				
Co-requisites	**--**				

Course Objectives:

- To understand the different issues involved in the design and implementation of a database system.
- To study the physical and logical database designs, database modelling, relational, hierarchical, and network models.
- To understand and use data manipulation language to query, update, and manage a database
- To develop an understanding of essential DBMS concepts such as: database security, integrity, concurrency.
- To design and build a simple database system and demonstrate competence with the fundamental tasks involved with modelling, designing, and implementing a DBMS

Course Outcomes:

On completion of this course, the students will be able to

- CO1. Describe the fundamental elements of relational database management systems.
- CO2. Define the basic concepts of relational data model, entity-relationship model, relational database design, relational algebra and SQL.
- CO3. Design ER-models to represent simple database application scenarios.
- CO4. Build Structured Query Language (SQL) and apply to query a database.

- CO5. Improve the database design by normalization.
- CO6. Familiar with basic database storage structures and access techniques: file and page organizations, indexing methods including B tree, and hashing.
- CO7. Convert the ER-model to relational tables, populate relational database and formulate SQL queries on data.

Catalogue Description:

This is an introductory course in database management systems (DBMS) and file management systems. The course will cover the role of data, files and databases in information systems, data modeling concepts, data definition and manipulation using SQL, issues in data management and the development and implementation of database applications. Students will work in the Lab on various assignments including prototyping and SQL, utilizing state of the art DBMS and CASE tools.

Course Content:

Unit I: **8 lecture hours**

Introduction to Database system architecture

Database system architecture: Data Abstraction, Data Independence, Data Definition Language (DDL), Data Manipulation Language (DML).

Data models: Entity-relationship model, network model, relational and object-oriented data models, integrity constraints, data manipulation operations.

ER models: Entity Set, Relation Ship Set, Cardinality Properties, Type of Entities, Type of Keys, Aggregation, Specialization and Generalization.

Unit II: **9 lecture hours**

Introduction Relational query languages

Relational query languages: Relational algebra, Fundamental Operations, Additional Operations. Select, Project, Cartesian Product, UNION, Set difference, Rename. Types of joining operations, Division, Intersection, Aggregate. Tuple and domain relational calculus, SQL3, DDL and DML constructs, Open source and Commercial DBMS - MYSQL, ORACLE, DB2, SQL server.

Unit III: **10 lecture hours**

Operation in , Dependency preservation, Lossless design

Relational database design: Integrity Constraint, Domain Constrain, Referential Integrity, Functional Dependencies, Closure of Set, Cover and Canonical Cover, Types of Anomalies, Armstrong's axioms, Extended Armstrong's axioms, Assertions and Demons.

Data Base Decomposition: Domain and data dependency, Normal forms: 1NF, 2 NF, 3 NF, BCNF, Dependency preservation, Lossless design.

Unit IV: **9 lecture hours**

Analysis in Query processing and optimization

Query processing and optimization: Evaluation of relational algebra expressions, Query equivalence, Join strategies, Query optimization algorithms.

Storage strategies: Indices, B-trees, B+-trees, hashing, File System, Disk Organization, Physical Storage, Buffer management.

Unit V: **9 lecture hours**

Case study in Database Security

Transaction processing: Failure, Recovery from Failure, Different States of Transaction, Transaction Isolation,

ACID property, Serializability of scheduling, Multi-version and optimistic Concurrency Control schemes.

Concurrency control: Locking and timestamp-based schedulers, 2-Phase Locking Protocol, Dead Lock,

Database Security: Authentication, Authorization and access control, DAC, MAC and RBAC models,

Intrusion detection, SQL injection. Advanced topics: Distributed databases, Data warehousing and data mining.

Text Books:

1. "Database System Concepts", 6th Edition by Abraham Silberschatz, Henry F. Korth, S. Sudarshan, McGraw-Hill
2. "Principles of Database and Knowledge – Base Systems", Vol 1 by J. D. Ullman, Computer Science Press.

Reference Books:

1. "Fundamentals of Database Systems", 5th Edition by R. Elmasri and S. Navathe, Pearson Education
2. "Foundations of Databases", Reprint by Serge Abiteboul, Richard Hull, Victor Vianu, AddisonWesley.

OLMCA204P	**Database Management System Lab**	**L**	**T**	**P**	**C**
Version 1.0	**Contact Hours -45**	**0**	**0**	**3**	**2**
Pre-requisites/Exposure	**Set Theory, Knowledge of programming language.**				
Co-requisites	**--**				

Course Objectives:

- To understand the different issues involved in the design and implementation of a database system.
- To study the physical and logical database designs, database modelling, relational, hierarchical, and network models
- To understand and use data manipulation language to query, update, and manage a database
- To develop an understanding of essential DBMS concepts such as: database security, integrity, concurrency,
- To design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS.

Course Outcomes:

On completion of this course, the students will be able to

- CO1. Identify the use of Database Systems in different software and applications.
- CO2. Develop the queries using SQL in database creation interaction.
- CO3. Define a commercial relational database system (Oracle, MySQL) by writing SQL using the system.

Catalogue Description:

This course introduces the core principles and techniques required in the design and implementation of database systems. This introductory application-oriented course covers the relational database systems RDBMS - the

predominant system for business scientific and engineering applications at present. It includes Entity-Relational model, Normalization, Relational model, Relational algebra, and data access queries as well as an introduction to SQL. It also covers essential DBMS concepts such as: Transaction Processing, Concurrency Control and Recovery. It also provides students with theoretical knowledge and practical skills in the use of databases and database management systems in information technology applications.

Course Content:

Experiment 1: Familiarization of structured query language.

Experiment 2: Table Creation.

Experiment 3: Insertion, Updation, Deletion of tuples.

Experiment 4: Executing different queries based on different functions.

Experiment 5: Performing joining operations.

Experiment 6: Nested Queries.

Experiment 7: Use of aggregate functions.

Experiment 8: Use of group functions.

Experiment 9: Use of order by functions.

Experiment 10: Arithmetic operations.

Experiment 11: Trigger using SQL.

Experiment 12: Introduction to PL/SQL.

Experiment 13: Report generation of various queries.

Experiment 14: Merging Data Bases with front end using ODBC connection.

Experiment 15: SQL Injection on a non-harmful test page.

Text Books:

1. "Database System Concepts", 6th Edition by Abraham Silberschatz, Henry F. Korth, S. Sudarshan, McGraw-Hill
2. "Principles of Database and Knowledge – Base Systems", Vol 1 by J. D. Ullman, Computer Science Press.

Reference Books:

1. "Fundamentals of Database Systems", 5th Edition by R. Elmasri and S. Navathe, Pearson Education

2. "Foundations of Databases", Reprint by Serge Abiteboul, Richard Hull, Victor Vianu, AddisonWesley.

OLMCA205	Discrete Mathematics	L	T	P	C
Version 1.0	Contact Hours -45	3	0	0	3
Pre-requisites/Exposure	Set Theory, Knowledge of programming language.				
Co-requisites	--				

Course Objectives:

- To develop an in-depth understanding of the algebraic structures like group, ring and field, combinatory, generating function, Recurrence relation, Graphs and Trees, mathematical logic.
- Students should be able to demonstrate application using the above mathematical tools in computer science related courses.

Course Outcomes:

On completion of this course, the students will be able to

- CO1. Define the fundamental knowledge to state the mathematical skills in Discrete Structure &Logic and allied fields.
- CO2. Define the fundamental knowledge to state the mathematical skills in basic and advance algebraic structures.
- CO3. Demonstrate basic concepts of combinatory including generating functions.
- CO4. Analyse the advance concept of graph theory in various mathematical fields.

Catalogue Description:

For any program related to Computer Science Discrete study of Mathematics is very much important. The purpose of this course is to understand and use (abstract) discrete structures and advance algebraic structure that are backbones of computer science. In particular, this course is meant to introduce logic, proofs, sets, relations, functions, counting, recurrence relation and graphs, with an emphasis on applications in computer science.

Course Content:

Unit I: **[11 lecture hours]**

Introduction to Sets, Relation and Function

Sets, Relation and Function: Operations and Laws of Sets, Cartesian Products, Binary Relation, Partial Ordering Relation, Equivalence Relation, Image of a function, Sum and Product of Functions, Injective, Surjective and Bijective functions, Composition of Functions, Inverse of functions.

Propositional Logic: Syntax, Semantics, Validity and Satisfiability, Basic Connectives and Truth Tables, Logical Equivalence: The Laws of Logic, Logical Implication, Rules of Inference.

Proof Techniques: Some Terminology, Proof Methods and Strategies, Forward Proof, Proof by Contradiction, Proof by Contraposition, Proof of Necessity and Sufficiency. Principles of Mathematical Induction: The Well-Ordering Principle, Recursive Definitions and Inductive proofs.

Unit II: [12 lecture hours]

Introduction to Advanced Counting Techniques

Size of a Set, Finite and infinite Sets, Countable and uncountable Sets, Cantor's diagonal argument and The Power Set theorem, Schroeder-Bernstein theorem.

The Division algorithm: Prime Numbers, The Greatest Common Divisor: Euclidean Algorithm, The Fundamental Theorem of Arithmetic.

Advanced Counting Techniques: Recurrence relations and their solutions, Divide and Conquer Relations, Generating Basics of Counting, Pigeonhole Principle, Permutations and Combinations, Discrete Probability, Generalized Permutations and Combinations, Generating Permutations.
Functions, Inclusion-Exclusion Principle.

Unit III: [11 lecture hours]

Operation in Algebraic Structures and Morphism

Algebraic Structures and Morphism: Algebraic Structures with one Binary Operation, Semigroups, Monoids, Groups, Congruence Relation and Quotient Structures, Free and Cyclic Monoids and Groups, Permutation Groups, Substructures, Normal Subgroups, Algebraic Structures with two Binary Operation, Rings, Integral Domain and Fields, Boolean Algebra, Boolean Expression and Boolean Function, Identities of Boolean Algebra, Duality. Boolean Ring

Unit IV: [06 lecture hours]

Case study in Isomorphism, Eulerian and Hamiltonian Walks

Graphs and Trees: Graphs and their properties, Degree, Connectivity, Path, Cycle, Sub Graph, Isomorphism,

Eulerian and Hamiltonian Walks, Shortest Path Problems, Graph Colouring, Colouring maps and example

Unit V: [05 lecture hours]

Case study in planar graph

Planar Graphs, Colouring Vertices, Colouring Edges, List Colouring, Perfect Graph, Rooted trees, trees and sorting, weighted trees and prefix codes, Bi-connected component and Articulation Points, Spanning trees and Minimum Spanning Trees.

Text Books:

T1. Kenneth H. Rosen,Discrete Mathematics and its Applications, Tata McGraw - Hill.

T2. V Somasundaram, Discrete Mathematics with Graph Theory and Combinatory, Tata McGraw- Hill.

Reference Books:

R1. Norman L. Biggs, Discrete Mathematics, 2nd Edition, Oxford University Press.

R2. Discrete Mathematics for Computer Science", Illustrated Edition, Kenneth Bogart, Clifford Stein, Robert L. Drysdale, Key College Publishing.

OLMCA206P	**Python Programming Lab**	**L**	**T**	**P**	**C**
Version 1.0	**Contact Hour -45**	**3**	**0**	**0**	**2**
Pre-requisites/Exposure	**Knowledge of Python Language**				
Co-requisites	**--**				

Course Objectives:

88. To **acquire** programming skills in core Python.
89. To **acquire** Object Oriented Skills in Python
90. To **develop** the skill of designing Graphical user Interfaces in Python
91. To **develop** the ability to solve and analyse mathematical problem in Python

Course Outcomes:

On completion of this course, the students will be able to

CO1. **Classify** how to Write, Test and Debug Python Programs
CO2. **Inspect** Conditionals structure Loops and various operators used in Python Programs CO3 **Experiment with** functions and **demonstrate** compound data using Lists, Tuples and Dictionaries
CO4 **Analyse** how Read and write data from & to files in Python. CO5. **Explain** and **develop** the concept of OOP in Python.

Catalogue Description:

This course introduces basic concepts in programming language to solve numerical problems. All the lectures will be devoted on discussions of basic theories and advanced topics, focusing on practical implementation of knowledge. Classes will be conducted by lecture as well as power point presentation, audio visual virtual lab session. The tutorials will familiarize the students with practical

problem-solving techniques led by the course coordinator. Students will strongly grab the basic concepts of the subject via exercise and discussions with the course coordinator.

Course Content:

Experiment 1:

92. Running instructions in Interactive interpreter and a Python Script.
93. Develop a program to purposefully to raise Indentation Error and Correct it.

Experiment 2:
Implement different data types, Operators and Expressions using Python language..

Experiment 3:
Implement the knowledge using Decision Statements(if, if-else, if-elif ladder)

Experiment 4:
Familiarize and usage of Loop & nested loop Statements (for, while, do-while)

Experiment 5:
Implement Python program using different sequential data types like List, Tuple, Dictionary Set

Experiment 6:
Understand and develop function programming, its types and function-call.

Experiment 9:
Implement the concept of data files and file handling in Python language.

Experiment 10:
Implement the concept of OOP properties with the help of Python syntax.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Examination Scheme:

Components	Internal Assessment	ETE
Weightage (%)	50	50

ADAMAS UNIVERSITY
SCHOOL OF ENGINEERING AND TECHNOLOGY END-SEMESTER EXAMINATION: JULY 2020

Name of the Program: MCA Semester: I Stream: CSE
PAPER TITLE: Python Programming Lab PAPER CODE: OLMCA206P
Maximum Marks: 50 Time duration: 3 hours
Total No of questions: 5 Total No of Pages: 01

Instruction for the Candidate:

94. At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, and Date of Exam.
95. All parts of a Question should be answered consecutively. Each Answer should start from a fresh page.
96. Assumptions made if any, should be stated clearly at the beginning of your answer.

Section A (Answer All the Questions) (5 x 10= 50)			
1.	Write a program to purposefully to **Inspect** Indentation Error and Correct it.	**AN**	**CO1**
2.	**Solve** a program to swap values of two variables with and without using third variable.	**AP**	**CO2**
3.	**Develop** a program to check whether the entered year is leap year or not (a year is leap if it is divisible by 4 and divisible by 100 or 400.)	**AP**	**CO2**
4.	**Construct** a program to create a structure named company which has name, address, phone and no Of Employee as member variables. Read name of company, its address, phone and no Of Employee. Finally display these members" value.	**AP**	**CO3**
5.	Write a program to **summarize** the concept of Multiple Inheritance with the help of Python syntax.	**U**	**CO5**

OLMCA301	**Design and Analysis of Algorithms**	**L**	**T**	**P**	**C**
Version 1.0	**Contact Hours – 45 Hours**	**3**	**0**	**0**	**3**
Pre-requisite/Exposure	**Discrete Mathematics**				
Co-requisite	**Concepts on Programming, Logical Ability, Problem Solving**				

Course Objectives:

- To introduce problem solving approach through design.
- To develop students to analyse the existing algorithms and approach for improvement.
- To introduce the students a perspective to different design and analysis approach for algorithm(s) to solve a problem.
- To develop students to select optimal solution to a problem by choosing the most appropriate algorithmic method

Course Outcomes:

On the completion of this course the student will be able to

- Understand the basics about algorithms and learn how to analyse and design algorithms
- Choose brute force, divide and conquer, dynamic programming and greedy techniques methods to solve computing problems
- Understand the approach for solving problems using iterative method.
- Describe the solution of complex problems using backtracking, branch and bound techniques.

- Classify the different Computability classes of P, NP, NP-complete and NP-hard.

Course Description:

Algorithmic study is a core part of Computer Science. This study caters to all possible applicable areas of Computer Science. This study includes observation, design, analysis and conclusion. Various types of algorithms have different notion of implementation according to their cost (in terms their time and space complexity). This study also includes refinement of one algorithm as per the applicability to real problems. Categorization of algorithms according to different method of design also includes in this course. It also compares the same algorithm using different algorithm design methods. For example, Knapsack problem can be solved in Greedy approach and Dynamic approach, both are optimization method. This course enables the students to think analytically while applying, designing an algorithm to solve a specific problem.

Course Content:

Unit-I	**09 Lecture Hours**

Introduction: Characteristics of algorithm. Analysis of algorithm: Asymptotic analysis of complexity bounds – best, average and worst-case behaviour; Performance measurements of Algorithm, Time and space trade-offs, Analysis of recursive algorithms through recurrence relations: Substitution method, Recursion tree method and Masters' theorem. Algorithm Design Paradigms.

Unit-II	**09 Lecture Hours**
Sorting Algorithms & Data Structures: Selection sort, bubble sort, insertion sort, Sorting in linear time, count sort, Linear search, **Divide & Conquer:** Quick sort, worst and average case complexity, Merge sort, Matrix multiplication Binary search, Binary search tree, Strassen's algorithm for matrix multiplication, The substitution method for solving recurrences, The recursion-tree method for solving recurrences, The master method for solving recurrences.	

Unit-III	**09 Lecture Hours**
Greedy algorithms: General Characteristics of greedy algorithms, Problem solving using Greedy Algorithm- Activity selection problem, Minimum Spanning trees (Kruskal's algorithm, Prim's algorithm), Graphs: Shortest paths, The Knapsack Problem **Dynamic programming:** Introduction, The Principle of Optimality, Problem Solving using Dynamic Programming- Making Change Problem, Assembly Line Scheduling, Knapsack problem, Matrix chain multiplication, Longest Common Subsequence Dynamic Programming using Memoization.	

Unit-IV	**09 Lecture Hours**

Graph Algorithms : Representations of graphs, Breadth-first search, Depth-first search, Topological sort, Strongly connected components, Minimum Spanning Trees, Growing a minimum-spanning tree, The algorithms of Kruskal and Prim, Single-Source Shortest Paths, Bellman-Ford algorithm, Single-source shortest paths in directed acyclic graphs, Dijkstra's algorithm, Difference constraints and shortest paths, Proofs of shortest-paths properties, All-Pairs Shortest Paths, Shortest paths and matrix multiplication, The FloydWarshall algorithm, Johnson's algorithm for sparse graphs, Maximum Flow, Flow-networks, The FordFulkerson method, **Branch & Bound & Backtracking**	
Unit-V	**09 Lecture Hours**
String Matching The naive string-matching algorithm, The Rabin-Karp algorithm, String matching with finite automata, The Knuth-Morris-Pratt algorithm **Approximation Algorithms:** The vertex-cover problem, The traveling-salesman problem, The set-covering problem, Randomization and linear programming **NP-Completeness:** Polynomial time, Polynomial-time verification, NP-completeness and reducibility, NP-completeness proofs , NP-complete problems.	
Text Books: Introduction to Algorithms, 4TH Edition, Thomas H Cormen, Charles E Lieserson, Ronald L Rivest And Clifford Stein, MIT Press/ Mcgraw-Hill. Fundamentals of Algorithms – E. Horowitz Et Al. Algorithm Design, 1ST Edition, Jon Kleinberg and Évatardos, Pearson. Book 3 – Author – Publisher Reference Books: Algorithm Design: Foundations, Analysis, And Internet Examples, Second Edition, Michael T Goodrich And Roberto Tamassia, Wiley. Algorithms -- A Creative Approach, 3RD Edition, Udimanber, Addison-Wesley, Reading, MA.	

OLMCA302	**Data Communication & Computer Network**	**L**	**T**	**P**	**C**
Version 1.0	**Contact hour-45**	**3**	**0**	**0**	**3**
Pre-requisites/Exposure	**Computer Fundamentals**				
Co-requisites	--				

Course Objective:

- To become familiar with fundamentals of computer network.
- To become familiar with transmission media and data communication.
- To become familiar with addressing techniques and protocols.
- To become familiar with file transfer protocols, and concepts of secured data communication technique.

Course Outcomes:

On the successful completion of the course, students will be able to

- Explain key networking concepts, principles, design issues and techniques at all protocol layers.
- Contrast between different types of networks (e.g., wide area networks vs. local area networks, wired vs. wireless) in terms of their characteristics and protocols used.
- Describe different types of networked applications and what underlying network protocols are needed to meet their diverse requirements.
- Distinguish between control and data planes in computer networks, and their corresponding architectures in real-world networks (including the Internet).
- Illustrate reliable transport protocols and networked system architectures via implementation using Socket APIs, measurement and analysis.

Catalogue Description:

In this course, students will study architectures, protocols, and layers in computer networks and develop client-server applications. Topics include the OSI and TCP/IP models, transmission fundamentals, flow and error control, switching and routing, network and transport layer protocols, local and wide-area networks, wireless networks, client-server models, and network security. Students will extend course topics via programming assignments, library assignments and other requirements.

Course Content:

Unit I: **5 lecture hours**

What Is the Internet?, Network Edge, Network Core, Delay, Loss, and Throughput in Packet-Switched Networks, Protocol Layers and Their Service Models, Networks Under Attack.

Unit II: **8 lecture hours**

Principles of Network Applications, Web and HTTP, Electronic mail in Internet, DNS—The Internet's Directory Service, Peer-to-Peer Applications.

Unit III: **9 lecture hours**

Introduction and Transport-Layer Services, Multiplexing and De-multiplexing, Connectionless Transport: UDP, Connection-Oriented Transport: TCP, Principles of Congestion Control, TCP Congestion Control

Unit IV: 9 lecture hours

Introduction, Virtual Circuit and Datagram Networks, Internet Protocol (IP): Forwarding and Addressing in the Internet, Routing Algorithms, Routing in the Internet, Routing in the Internet, Broadcast and Multicast Routing

Unit V: 9 lecture hours

Introduction to the Link Layer, Error-Detection and -Correction Techniques, Multiple Access Links and Protocols, Switched Local Area Networks, Link Virtualization.

Unit VI: 3 lecture hours

What Is Network Security? Principles of Cryptography

Unit VII: 2 lecture hours

What Is Network Management? Internet-Standard Management Framework

Text Books:

1. Computer Networking -Top Down Approach- James F. Kurose and Keith W. Ross-- Pearson 2013, sixth Edition

2. Data Communications and Networking- Behrouz A. Forouzan-McGraw-Hill 2007, fourth Edition.

Reference Books:

Data Networks- DimitriBertsekas and Robert Gallager- Prentice Hall, 1992

Computer Networks (5th Edition) – Andrew S. Tanenbaum, Pearson 2011

OLMCA303	**Graph Theory**	**L**	**T**	**P**	**C**
Version 1.0	**Contact Hours – 45 Hours**	**3**	**0**	**0**	**3**
Pre-requisite/Exposure	**Data Structures**				
Co-requisite	**--**				

Course Objectives:

- To understand and apply the fundamental concepts in graph theory.
- To apply graph theory-based tools in solving practical problems.
- To improve the proof writing skills.
- To state the theorems and prove formally using various techniques.
- To understand various graphs algorithms and analyse them.

Course Outcomes:

On the completion of this course the student will be able to

- CO1: Understand the different distance measures in graphs. Define the special types of graphs – complete graph, regular graph, bipartite graph and their properties.
- CO2: Discuss the properties of trees, Arboricity, vertex and edge connectivity, auto-morphism groups, reconstruction problem and Mengers theorem.
- CO3: Distinguish between Eulerian and Hamiltonian Graphs. Demonstrate Euler's theorem, Kuratowski's theorem, Colouring of planar graphs, Crossing number and thickness.
- CO4: Explain Query processing and optimization. Analyze the storage strategies
- CO5: Differentiate among the matching factors, decomposition and domination in graph theory.

Course Description:

This course is aimed to cover a variety of different problems in Graph Theory with an emphasis on applications and modelling. Graph theory is a study of graphs, trees and networks. In this course students will come across a number of theorems and proofs. Theorems will be stated and proved formally using various techniques. Topics that will be discussed include Euler formula, Hamilton paths, planar graphs and coloring problem; the use of trees in sorting and prefix codes; useful algorithms on networks such as shortest path algorithm, minimal spanning tree algorithm and min-flow max-cut algorithm.

Course Content:

Unit-I	**8 Lecture Hours**
Basics: Graph – definition; Degree sequences, Different distance measures in graphs, Special types of graphs – complete graph, regular graph, bipartite graph and their properties.	
Unit-II Unit-II Structure and Symmetry: Cut vertices, bridges and blocks, auto-morphism groups, reconstruction problem. Trees and Connectivity: Properties of trees, Arboricity, vertex and edge connectivity, Mengers theorem.	**9 Lecture Hours**

Unit-III Unit-III Eulerian and Hamiltonian Graphs: Characterization of Eulerian graphs, Sufficient Conditions for Hamiltonian graphs. Colouring and Planar Graphs: Vertex and edge colouring, perfect graphs, planar graphs, Euler's theorem, Kuratowski's theorem, Colouring of planar graphs, Crossing number and thickness.	**10 Lecture Hours**
Unit-IV	**9 Lecture Hours**
Query processing and optimization: Evaluation of relational algebra expressions, Query equivalence, Join strategies, Query optimization algorithms. Storage strategies: Indices, B-trees, B+-trees, hashing,	

File System, Disk Organization , Physical Storage, Buffer management.	
Unit-V	**9 Lecture Hours**
Vert Matching, factors, decomposition and domination. External Graph Theory: Turan's theorem , Ramsay's theorem, Szemeredi's regularity lemma and their applications.	
Text Books: 1. Graph Theory, J. A. Bondy and U. S. R. Murthy, Sringer Verlag, 2008. 2. Introduction to Graph Theory, D. B. West, PHI, 2004.	
Reference Books: 1. Graph Theory, R. Diestel, Sringer Verlag, 2003.	

OLMCA304	**Formal Language and Automata Theory**	**L**	**T**	**P**	**C**
Version 1.0	**Contact Hours – 45 Hours**	**3**	**0**	**0**	**3**
Pre-requisite/Exposure	**NIL**				
Co-requisite	**NIL**				

Course Objectives:

- Introduce concepts in automata theory and theory of computation
- Identify different formal language classes and their relationships
- Design grammars and recognizers for different formal languages
- Prove or disprove theorems in automata theory using its properties
- Determine the decidability and intractability of computational problems

Course Outcomes:

On the completion of this course the student will be able to

- Define the basic concepts in formal language theory, grammars, automata theory, computability theory, and complexity theory.
- Demonstrate abstract models of computing, including deterministic (DFA), non-deterministic (NFA), Push Down Automata (PDA) and Turing (TM) machine models and their power to recognize the languages.
- Prove and disprove theorems establishing key properties of formal languages and automata.
- Acquire a fundamental understanding of core concepts relating to the theory of computation and computational models including (but not limited to) decidability and Intractability.
- Solve fundamental problems related to Computational Model.

Course Description:

This course will provide a foundation to the "Theory of Computation". The student will realize that the sometimes chaotic technology oriented world of computers has a very elegant mathematical basis to it. This basis is deeply rooted in mathematics developed before the days of modern computers. Our study will lead to some interesting implications concerning the theoretical limits of computing. On the practical side, this course is a background for a course on compilers. Topics covered in this course include: mathematical prerequisites, finite state machines (automata), concept of a language and grammars, deterministic and non-deterministic accepters, regular expressions and languages, contextfree languages, normal/canonical forms, pushdown automata, Turing machines, context sensitive languages, recursive and recursively enumerable languages. Each of the language classes has two points of view: a class of automata defining the language, and a class of grammars defining the language. This dual approach to defining languages, will finally lead to the Chomsky hierarchy of languages. We shall observe that the Turing Machine not only serves to define a language class, but also a mathematical model for computation itself and defines the theoretical limits of computation.

Course Content:

Unit-I	**09 Lecture Hours**
Mathematical Preliminaries: Set Theory, Describing a Set, Empty Set, Identity and Cardinality, Subset, Power Sets, Operations on Sets: Union, Intersection, Set Theoretic Equalities, Sequence versus Set, Ordered Pairs, Cartesian Product,Relations, Binary Relation, Domain and Range of Relation, Operations on Relations, Properties of Relations, Functions, Types of Functions, Alphabet, String and Language, Operations on Language, Grammars, Types of Grammars–Chomsky Hierarchy, Graphs and Trees, Directed Graph, Undirected Graph, Trees, Lemma, Theorem Proving, Proof by Induction Proof by Contradiction, Proof by Example.	
Unit-II	**09 Lecture Hours**

Finite Automata: Finite-state Machine, Finite-Automaton Model, Properties of Transition Function 'c', Transition Diagram, Transition Table, Language Acceptance, Two Types of Finite Automata, Deterministic Finite Automata (DFA) Non-deterministic Finite Automaton, Acceptance of NFA, Equivalence of DFAs and NFAs, Converting NFA to DFA, Subset Construction, NFA with Epsilon-(ε) Transitions, Epsilon Closure (e-closure), Eliminating e-Transitions, Converting NFA with ε-Transition to NFA, without εTransition, Converting NFA with ε-Transition to DFA, Comparison Method for Testing, Equivalence of Two FA, Reduction of Number of States in FA, Indistinguishable States, Equivalent Classes, Minimization of DFA, Minimization of DFA Using Myhill Nerode Theorem, Finite Automata with Output, Moore Machine, Mealy Machine, Equivalence Between Moore and Mealy Machines, Interconversions Between Machines, Applications of Finite Automata with Output, The Full-adder, The String Sequence Detector. **Regular Languages and Regular Grammar:** Regular language, Regular expressions, Deterministic finite automata (DFA) and equivalence with regular expressions, NFA and equivalence with DFA, Regular grammars and equivalence with finite automata, Properties of regular languages, Pumping lemma for regular languages, Problem solving using pumping lemma.	
Unit-III Pushdown Automata & Context Free Languages: Graphical Representation of PDA, Instantaneous Description of PDA, Language Acceptance by PDA, Equivalence of Acceptance of Final State and Empty Stack, Types of PDAs, Deterministic PDA, Closure Properties of DCFL, Decision Properties of DCFLs, DPDA and Regular Languages, DPDA and Ambiguous Grammar, Equivalence of PDA's and CFG's, Nondeterministic pushdown automata (NPDA), NPDA and equivalence with CFG, Constructing PDA for Given CFG, Constructing CFG for the Given PDA, Two-stack PDA, Applications of PDA, PDA as a Parser, Top-down Parser Using the PDA, Pumping lemma for context-free languages. Context Free Grammar: Context-free grammars (CFG), Leftmost and Rightmost Derivations, Derivation Tree, Equivalence of Parse Trees and Derivations, Ambiguous Grammar, Removing Ambiguity, Inherent Ambiguity, Simplification of Grammars, Elimination of Useless Symbols, Elimination of e-Productions, Eliminating Unit Productions, Chomsky normal forms, Greibach normal forms	**09 Lecture Hours**
Unit-IV Context Sensitive Grammar and Languages: Context-sensitive grammars (CSG), Context-sensitive Languages, Linear bounded automata, Linear bounded automata and equivalence with CSG, Properties of Context-sensitive grammars (CSG) and Languages, Properties of Linear bounded automata. Turing Machine: Turing Assumptions, Instantaneous Description, Turing Machine as Language Accepter, Turing Machine as a Computational Machine, Techniques for Turing Machine Construction, Storage in Finite Control, Multi-track Tape, Checking off Symbols, Subroutines, Shifting Over, Types of Turing Machines, Nondeterministic Turing Machines, Turing Machines with Two-dimensional, Tapes, Turing Machines with Multiple Tapes, Turing Machines with Multiple Heads, Turing Machines with Infinite Tape, Church's Thesis, Turing Machines as Enumerators, Universal Turing Machine, Counter Machine, Recursive and Recursively Enumerable Languages, Unrestricted grammars and equivalence with Turing machines, Church-Turing thesis, universal Turing machine, Rice's theorem, undecidable problems about languages	**09 Lecture Hours**
Unit-V Decidability: Decidable Languages, Decidable problems concerning regular languages, Decidable problems concerning context-free languages, Undecidability, The	**09 Lecture Hours**

diagonalization method, An undecidable language, A Turing-unrecognizable language. Reducibility: Undecidable Problems from Language Theory, Reductions via computation histories, Simple Undecidable Problem, Mapping Reducibility, Computable functions, Formal definition of mapping reducibility. Time Complexity: Measuring Complexity, Big-O and smallo notation, Analyzing algorithms, Complexity relationships among models, The Class P, Polynomial time, Examples of problems in P, The Class NP, Examples of problems in NP, P versus NP, NP-completeness, Polynomial time reducibility, Definition of NP-completeness, The Cook–Levin Theorem. Space Complexity: Savitch's Theorem, The Class PSPACE, PSPACEcompleteness	
Decidability: Decidable Languages, Decidable problems concerning regular languages, Decidable problems concerning context-free languages, Undecidability, The diagonalization method, An undecidable language A Turing-unrecognizable language **Reducibility:** Undecidable Problems from Language Theory, Reductions via computation histories, Simple Undecidable Problem, Mapping Reducibility , Computable functions, Formal definition of mapping reducibility **Time Complexity:** Measuring Complexity, Big-O and small-o notation, Analyzing algorithms, Complexity relationships among models, The Class P, Polynomial time, Examples of problems in P, The Class NP, Examples of problems in NP, P versus NP, NP-completeness, Polynomial time reducibility, Definition of NP-completeness, The Cook–Levin Theorem **Space Complexity:** Savitch's Theorem, The Class PSPACE, PSPACE-completeness	
Text Books: Introduction to Automata Theory, Languages, and Computation, 3rd Edition, John E. Hopcroft Rajeev Motwani and Jeffrey D. Ullman, Pearson Education. Michael Sipser, Introduction to the Theory of Computation, PWS Publishing An Introduction To Formal Languages And Automata, Peter Linz Reference Books: Harry R. Lewis and Christos H. Papadimitriou, Elements of the Theory of Computation,Pearson Education Asia. Dexter C. Kozen, Automata and Computability, Undergraduate Texts in Computer Science, Springer.	

OLMCA310	**Web Technology Lab**	**L**	**T**	**P**	**C**
Version 1.0	**Contact Hours -30**	**0**	**0**	**3**	**2**
Pre-requisites/Exposure	**Basic Knowledge of Coding**				
Co-requisites	**---**				

Course Objectives:

193. To introduce students how to design static webpage using HTML and CSS
194. To provide knowledge on web architecture, web services, client side and server side scripting technologies to focus on the development of web-based information systems and web services

Course Outcomes:

On completion of this course, the students will be able to

CO1: **Design** a static webpage by applying HTML elements CO2:
Apply CSS concepts for designing HTML web pages.
CO3: **Develop** DHTML pages by using JavaScript with DOM events CO4**:**
Implement a webpage with database connectivity using PhP CO5: **Create** rich internet application using XML.

Catalog Description:

The main objective of this course is on the World Wide Web as a platform for interactive applications, content publishing and social services. The development of web-based applications requires knowledge about the underlying technology and the formats and standards the web is based upon. In this course you will learn about the HTTP communication protocol, the markup languages HTML, XHTML and XML, the CSS and XSLT standards for formatting and transforming web content, interactive graphics and multimedia content on the web, client-side programming using JavaScript.

Course Content:

Suggested assignments to be framed based on the following Programming Language such as HTML, CSS, Java script, XML and PH

Experiment 1:
Introduction to web page design, attributes and concept by taking an example of online job-portal

Experiment 2:
Explain the logic of HTML and its feature, heading, color, background color, (h1 to h6).

Experiment 3:
Design a preliminary web page by using HTML table, create, row, header, data insertion.

Experiment 4:

Design a web page by using HTML form tag and explore its features by taking reference of some E-commerce web site (Mantra, Zabong etc)

Experiment 5:

Design a web page by using HTML form attributes (Radio button, submit button, drop down menu, check box etc) in Online Ticket booking

Experiment 6:

Design a List in HTML (Ordered list and Un-ordered list).

Experiment 7:

Design an event page by using JavaScript in E-commerce website.

Experiment 8:

Design a web page by using JavaScript for arithmetic and logical operation.

Experiment 9:

Design a page enabling idea of Java string, Java switch, DOM model. By taking an online movie ticket booking

Experiment 10:

Design a web repository knowledge base by using XML-ontology.

Experiment 11:

Write a PHP class that sorts an ordered integer array with the help of sort () function

Experiment 12:

Write a PHP Calculator class which will accept two values as arguments, then add them, subtract them, multiply them together, or divide them on request.

Text Books:

1. "Web Design The Complete Reference", Thomas Powell, Tata McGraw-Hill
2. "Web Design The Complete Reference", Thomas Powell, Tata McGraw-Hill

Reference Books:

1. "PHP : The Complete Reference", Steven Holzner, Tata McGraw-Hill The Easy Guide to Operating Systems, Larry Miller, 2012.
2. "Javascript 2.0 : The Complete Reference", Second Edition By Thomas Powell And Fritz Schneider

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Examination Scheme:

Components	Internal Assessment	ETE
Weightage (%)	50	50

Model Question Paper

Name: Enrolment **No:**	

ADAMAS UNIVERSITY
SCHOOL OF ENGINEERING AND TECHNOLOGY END-SEMESTER EXAMINATION: JULY 2020

Name of the Program: MCA Semester: III Stream: CSE
PAPER TITLE: Web Technology Lab
PAPER CODE: OLMCA310

Maximum Marks: 50	Time duration: 3 hours
Total No of questions: 12	Total No of Pages: 02

Instruction for the Candidate:
At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, and Date of Exam. All parts of a Question should be answered consecutively. Each Answer should start from a fresh page.
Assumptions made if any, should be stated clearly at the beginning of your answer.

SECTION A (Answer All questions)(5 x 10=50)

1.	**Develop** the web page for Student database.	**Ap**	**CO4**
2.	**Define** Imagemap? Design a webpage to display the cricket player's information using Imagemap.	**R**	**CO1**
3.	**Construct** a webpage for creating a registration form using HTML &CSS.	**Ap**	**CO4**
4.	**Build** a webpage in such a way that display MCA course Details with Routine	**Ap**	**CO5**
5.	**Illustrate** the use of <form> tag and action Attribute with an example.	**U**	**CO1**

OLMCA403	**Compiler Design**	**L**	**T**	**P**	**C**
Version 1.0	**Contact Hours – 45 Hours**	**3**	**0**	**0**	**3**
Pre-requisite/Exposure	**Finite Automata, Data structures, Computer Organization.**				
Co-requisite	**NIL**				

Course Objectives:

- To understand students how the process of language translation process.

- To interpret students the theory and practice of compiler implementation.
- To enhance the skills of student to implement lexical analysis, a variety of parsing techniques and semantic analysis of a programming language, along with error detection and recovery.
- To allow the students to identify the various storage allocation, code optimization techniques and code generation.
- To understand students the use of object code generation process

Course Outcomes:

On the completion of this course the student will be able to

- CO1: Understand the major phases of compilation, particularly lexical analysis.
- CO2: Understand the basic concepts of parsing and Design parser for a given languageusing top down and Bottom-up parser.
- CO3: Demonstrate the use of formal attributed grammars for specifying the syntax and semantics of Programming languages.
- CO4: Apply various optimization techniques for the design of a compiler.
- CO5: Understand the concepts of symbol tables and implement code generation techniques.

Course Description:

This course will teach students the fundamental concepts and techniques used for building a simple compiler. It will also discuss the major ideas used today in the implementation of programming language compilers, including lexical analysis, parsing, syntax-directed translation, abstract syntax trees, types and type checking, intermediate languages, dataflow analysis, program optimization, code generation, and runtime systems. As a result, you will learn how a program written in a high-level language designed for humans is systematically translated into a program written in low-level assembly more suited to machines. Along the way we will also touch on how programming languages are designed, programming language semantics, and why there are so many different kinds of programming languages.

Course Content:

Unit-I Unit-I Introduction of Compilers and Lexical Analysis and Lex/Flex: Overview of language processing – pre-processors – compiler – assembler – interpreters, pre-processors, – linkers & loaders - structure of a compiler – phases of a compiler. Lexical Analysis – Role of Lexical Analysis – Lexical Analysis Vs Parsing – Token, patterns and Lexemes – Lexical Errors – Regular Expressions – Regular definitions for the language constructs – Strings, Sequences, Comments – Transition diagram for recognition of tokens, Reserved words and identifiers,	**09 Lecture Hours**

Examples.	
Unit-II	**09 Lecture Hours**
Syntax Analysis and Yacc/Bison: Syntax Analysis – discussion on CFG, LMD,RMD, parse trees, Role of a parser – classification of parsing techniques – Brute force approach, left recursion, left factoring, Top down parsing – First and Follow- LL(1) Grammars, Non-Recursive predictive parsing – Error recovery in predictive parsing. Bottom up parsing, Types of Bottom up approaches. Introduction to simple LR – Why LR Parsers – Model of an LR Parsers – Operator Precedence- Shift Reduce Parsing – Difference between LR and LL Parsers, Construction of SLR Tables. More powerful LR parses, construction of CLR (1), LALR Parsing tables, Dangling ELSE Ambiguity, Error recovery in LR Parsing, Comparison of all bottoms up approaches with all top down approaches.	
Unit-III	**09 Lecture Hours**
Intermediate Code Generation: Semantic analysis, SDT Schemes, evaluation of semantic rules. Intermediate Code Generation: Intermediate languages, three address code, quadruples, triples, abstract syntax trees. Types and declarations, Assignment statements, Boolean expressions, Case statements, Back Patching, Procedure calls type Checking.	
Unit-IV	**09 Lecture Hours**
Code Optimization: Code Optimization: Introduction, The Principal sources of optimization, Optimization of basic blocks, Loops in flow graphs, Introduction to global data-flow analysis, Iterative solution of data-flow equations, Code improving transformations, Dealing with aliases, Data-flow analysis of structured flow graphs, Efficient data-flow algorithms, A tool for data-flow analysis, Estimation of types, Symbolic debugging of optimized code.	
Unit-V	**10 Lecture Hours**
Run-Time Environment and Code Generation: Symbol tables: use and need of symbol tables. Runtime Environment: storage organization, stack allocation, access to non-local data, heap management, parameter passing mechanisms, introduction to garbage collection, Reference counting garbage collectors. Code generation: Issues, target language, Basic blocks & flow graphs, Simple code generator, Peephole optimization, Register allocation and assignment.	

Text Books:

Compilers, Principles Techniques and Tools- Alfred V Aho, Monica S Lam, Ravi Sethi, Jeffrey D. Ullman,2ndEdition, Pearson,2007.
Compiler construction, Principles and Practice, Kenneth C Louden, 1st Edition, CENGAGE **Reference Books:**
Compiler Design, K. Muneeswaran, Oxford. 2012
Engineering a compiler, Keith D.Cooper& Linda Torczon, Morgan Kaufman, 2nd edition. MK publishers, 2012.
Principles of compiler design, V. Raghavan, 2nd Edition, Tata Mcgraw Hill, 2011.

OLMCA404	**HSS-VI (Basics of Organizational Behaviours)**	**L**	**T**	**P**	**C**
Version 1.0	**Contact Hours -45**	**3**	**0**	**0**	**3**
Pre-requisites/Exposure	**Organization evolution at basic level of social study**				
Co-requisites	**--**				

Course Objectives :
297. To help the student to acquire knowledge of organization evolution process.
298. To enable students modelling organization project with appropriate metric and precision at workplace.
299. To give the students a perspective to organization design process variables by exposing them to organization specification document.
300. To enable students, acquire testing and quality assessment of organization model required for their profession.

Course Outcomes:

On completion of this course, the students will be able to

CO1. Understand the impact of organizational behaviour.
CO2. Communicate with proper organizational model paradigm to pupils.
CO3. Enhancement of organizational metric engineering application in industry. CO4. Effectively analyse organization and maintenance of project.
CO5. Illustrate organizational metric analysis for an effective model.
Catalog Description:

There is a growing need for talented organizational developers across every industry. As technology advances, the ability to build quality organisation while considering design, development, security, and maintenance is sought after amongst all kinds of companies, from finance and banking to healthcare and national security.
Organisational behaviour applies the knowledge and theoretical understanding gained through behavioural science to building high-quality products in organisation. As a maturing discipline, Organisational behaviour is becoming more and more important in our everyday lives.

Course Content:

5 Lecture Hour

Module 1: Introduction: Historical development; concept of organization; elements of organizational structure; scope of organizational behaviour.

8 Lecture Hour

Module 2: Motivation and job satisfaction: Major theories; content and process; (Adams, Maslow, Vroom, Herzberg). Intrinsic and extrinsic motivation; incentive systems - Job satisfaction; concept and determinants.

8 Lecture Hour

Module 3: Leadership: Functions and approaches; trait, behavioural and contingency models; characteristics of successful leaders; role of power in leadership.

8 Lecture Hour

Module 4: Communication: Communication process- types of communication; communication channels and networks; barriers to communication.

8 Lecture Hour

Module 5: Group behavior and conflict: Defining and classifying groups; stages of group development; concept, causes and consequences of conflicts; methods of conflict-resolution.

8 Lecture Hour

Module 6: Behavior in organizations: Human perception and motivation, human learning and problem solving, people are unique, groups in organizations, leader and group effectiveness

Text Books:

297. Aamodt, M. G. (2001). Industrial/organizational psychology. New Delhi: Cengage
298. Muchincky. (2009). Psychology applied to work. New Delhi: Cengage.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Examination Scheme:

Components	**Class Assessment**	**Mid Term**	**End Term**
Weightage (%)	**30**	**20**	**50**

Model Question Paper

ADAMAS UNIVERSITY

SCHOOL OF ENGINEERING AND TECHNOLOGY END-SEMESTER EXAMINATION: JULY 2020

Name of the Program: MCA Semester: IV Stream: CSE
PAPER TITLE: HSS –IV (Basics of Organizational Behaviours) PAPER CODE: OLMCA404
Maximum Marks: 50 Time duration: 3 hours
Total No of questions: 12 Total No of Pages: 01

Instruction for the Candidate:

297. At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, and Date of Exam.
298. All parts of a Question should be answered consecutively. Each Answer should start from a fresh page.
299. Assumptions made if any, should be stated clearly at the beginning of your answer.

Section A (Answer All the Questions) (5 x 2 = 10)			
1.	**List** the steps involved in organizational structure? Write a note on it.	**U**	**CO1**
2.	**Enumerate** the basic elements of organizational behaviour requirement specification.	**U**	**CO2**

3.	**Define** leader ship strategy.	**R**	**CO3**
4.	**What** is group behavior?	**R**	**CO4**
5.	**Give** the principles of conflict management.	**U**	**CO4**
	SECTION B (Attempt any **Three Questions) (3 x 5 = 15)**		
6.	**Describe** the stages of evolutionary organization model?	**U**	**CO1**
7.	**Examine** the essential phases of communication channels and networks?	**Ap**	**CO2**
8.	**Elucidate** the barriers to communication with suitable example.	**Ap**	**CO3**
9.	**Explain** incentive system with proper example?	**Evaluate**	**CO4 /CO2**
	SECTION C (Answer Any Two Questions) (2 x 12.5 = 25)		
10.	**Explain** in detail about Intrinsic and extrinsic motivation	**U**	**CO4**
11.	**Write** a Project estimation technique and estimation issues in project progress line.? Explain with a Case Study	**Create**	**CO4**
12.	**Distinguish** features of the factors i) behavioral and contingency models, ii)Leadership strategy?	**An**	**CO5**

OLMCA405	**Seminar**	**L**	**T**	**P**	**C**
Version 1.0	**Contact hour -30**	**0**	**2**	**0**	**2**
Pre-requisites/Exposure	**Knowledge on Computer domain**				
Co-requisites	--				

Course Objectives:

313. **To develop** skills in doing literature survey, technical presentation and report preparation.
314. To **enable** project identification and execution of preliminary works on final semester project

Course Outcomes:

On completion of this course, the students will be able to CO1.

Identify the advanced technologies and globalization
CO2. **Develop** communication and representation skills towards becoming a good team leader and manager
CO3. **Plan** for lifelong learning towards industry readiness

CO4. **Build** the ability to identify an engineering problem, analyze it and propose a work plan to solve it.

Catalog Description:

The course involves presentation and report submission by every student. Reference search and technical writing skills along with effective presentation skills are focused. The course strengthens the research attributes including literature survey.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Examination Scheme:

Components	Internal Assessment	ETE
Weightage (%)	50	50

OLMCA406	Major Project- Internship Embedded Project work & Viva Voce (or) Research work, Dissertation & Thesis	L	T	P	C
Version 1.0	Contact Hours -60	0	0	8	4
Pre-requisites/Exposure	Basic idea of the required subjects				

Course

Objectives:

315. To be able to design, develop, document, and test software using current techniques.
316. To understand the fundamentals of computer architecture and computing theory.
317. To be able to solve problems working in group settings.
318. To demonstrate the ability to give presentations and write technical reports.
319. To demonstrate understanding of the importance of social and ethical issues related to the profession.

Course Outcomes:

On completion of this course, the students will be able to

CO1**. Identify** a real world problem
CO2. **Utilize** the modern tools to solve the problems
CO3. **Discuss** in a group to promote team spirit and leadership quality among the students CO4. **Plan** a projects involving both technological aspects and finance
CO5. **Identify** newer areas of in depth study and research and lifelong learning

Catalog Description:

The course encourages students to take project works that are based on current trends and technologies in various subjects, which will augment the theory subjects. The students will form a group to do their project work. This teaming is to encourage team spirit and to insist the importance of team work. The students typically undergo group formation, finalization of area of work, testing, generation and verification of results, and possible research publication procedure.

Course Content:

The Evaluation of the project work are to be carried out in the following way:

1. In-depth study of a topic proposed by the supervisor
2. Continuous Evaluation through guide.
3. An open pre-submission seminar by the student.
4. End-semester University Examination (An open seminar followed by a Viva voce)

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Examination Scheme:

Components	Internal Assessment	ETE

OLMCA311	Mobile Application using Android/IoS Lab	L	T	P	C
Version 1.0	Contact Hours -30	0	0	3	2
Pre-requisites/Exposure	Set Theory, Knowledge of programming language.				
Co-requisites	--				

Course Objectives:

197. To introduce students familiar with client server architecture.
198. To develop a web application using java technologies
199. To develop skills and project-based experience needed for entry into web application and development careers.

Course Outcomes:

CO1**. Produce** apps for iOS platform devices (iPhone/iPad/iPod Touch) CO2**. Develop** a working knowledge of Apple's Xcode app development tool CO3**. Identify** need and opportunity in app markets

Catalog Description:

Although they have only become widely used in the past few years, mobile devices have already had a tremendous impact on our culture and its social dynamics. Recent rapid growth in the mobile device market has not been primarily driven by voice communications, but rather by the limitless ways in which these devices may be used to explore our local environments. These new communicative modes are expressed through small and self-contained "apps" that are focused around a central concept, and that leverage many of the advanced features of these devices to augment a user's understanding of her environment. This course operates

in two distinct but related modes: development, wherein an app is made functional; and design, through which an app is made usable. Students will be expected to consider both modes when producing their apps. Students will work throughout the semester to produce a compelling app of interest to the UNC community

Course Content:

List of Experiments:

1. Introduction to Android platform and the tools used in the lab, demonstrating various mobile apps such as Google Drive, Google Assistant and Google Maps to get an essence of the hardware and software advancement
2. Illustrating the structure of an Android Project, Creating a new AVD and Create a simple Android application that displays the message "Welcome to Android Development". Test this app on an AVD.

3. Developing of an application with Graphical User Interface such as Task Scheduler app to keep track of the tasks the user needs to complete within a specific due date.

4. Developing Movie Rating App to add validation for the inputs and handling UI events.

5. Enhancing the Movie Rating App for handling data in the mobile app to display the list of reviews in the app fetched from the SQLite database.

6. Enhancing the Task Scheduler app for handling data in the mobile app to store in the database and display the task details entered by the user.

7. Developing a Note Management app to store and retrieve data from a file.

8. Enhancing the Movie Rating App to create options and context menu for adding new reviews, exit option etc.

9. Enhancing the Movie Rating App to create notifications such as a confirm delete dialog box during deleting a review.

10. Developing of a Media Player app to gain knowledge on the integration of graphics and multimedia with a mobile app.

11. Securing an Android app by declaring permissions using graphical user interface.

12. Developing of an app Find the Greatest that accepts three numbers from the user and computes the greatest of the three numbers. Test the project to find whether it is working properly or not by creating a test project for the app.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Examination Scheme:

Components	Internal Assessment	ETE
Weightage (%)	**50**	**50**

Model Question Paper

ADAMAS UNIVERSITY
SCHOOL OF ENGINEERING AND TECHNOLOGY END-SEMESTER EXAMINATION: JULY 2020

Name of the Program: MCA Semester: II Stream: CSE
PAPER TITLE: Mobile Applications using Android/IoS Lab PAPER CODE: OLMCA311
Maximum Marks: 50 Time duration: 3 hours Total
No of questions: 5 Total No of Pages: 01

Section A (Answer All the Questions) (5 x 10 = 50)			
1.	**Developing** Movie Rating App to add validation for the inputs and handling UI events	**U**	**CO1**

2.	**Write** Dynamic HTML with Java Script.	**Ap**	**CO1**
3.	**Write** the steps of Compiling and Installing the Servlet	**Ap**	**CO2**
4.	**Examine** JDBC Process.	**Ap**	**CO2**
5.	**Describe** Database Connection.	**U**	**CO6**

OLMCA305T	**Artificial Intelligence and Machine Learning (Elective -1)**	**L**	**T**	**P**	**C**
Version 1.0	**Contact hours -45**	**3**	**0**	**0**	**3**
Pre-requisites/Exposure	**Basics of Algorithm, Linear Algebra, Probability, and Statistics**				
Co-requisites	--				

Course Objectives:

- To help the student to acquire knowledge of basics of artificial intelligent computing.
- To enable students to gain basic knowledge of machine learning.
- To incorporate the evolutionary computational knowledge.
- To enable students to acquire various problem solving, learning, and planning ability.
- To enable students to apply machine learning models to solve real-life problems.

Course Outcomes:

On completion of this course, the students will be able to

- CO1. Define solution according to real problem, apply search proper strategies for a particular problem, and construct logical propositions to conclude a proof statement.
- CO2. Construct and differentiate plan for specific problem solution using various planning strategies.
- CO3. Implement predictive and classification model using regression method.
- CO4. Design and deploy Multilayer Artificial Neural Network using backpropagation algorithm for different dataset, probabilistic model using conditional probability (Baye's Theorem).
- CO5. Construct SVM for linearly and non-linearly (kernel method) separable data. Generate Ability to select best features from the dataset using PCA.

Catalogue Description:

There is a growing need for talented machine learning/data scientist developers across every industry. As

technology advances, the ability to build quality machine learning driven software while considering design, development, security, and maintenance is sought after amongst all kinds of companies, from finance and banking to healthcare and national security.

Machine Learning applies the knowledge and theoretical understanding gained through computer science to buildin high-quality intelligent software products. As a maturing discipline, Artificial Intelligence is becoming more and more important in our everyday lives. Our software development and engineering professional program is University's response to the tremendous growth of the software development industry.

Course Content:

Unit I: 8 lecture hours

Module 1:
Introduction, Agents, Problem formulation, Uninformed search strategies, Heuristics, Informed search strategies, Satisfying constraints

Logical agents, Propositional logic, Inference rules, First-order logic, Inferences in first order logic

Unit II: 10 lecture hours
Planning with state-space search, Partial-order planning, planning graphs, Planning and acting in the real world Forward and backward chaining, Unification, Resolution.

Introduction to Machine Learning: Overview of machine learning, related areas, applications, software tools, course objectives.

Basics of Machine Learning: Learning Topologies: Training-Testing-Validation; Error: Actual Output; Target Output; Error Optimization: Gradient Descent (SGD, Minibatch); Parameter Update; Dataset and cleaning, Normalization; Bias and Variance; Hypothesis Testing;

Unit III: 6 lecture hours

Regression: Linear Regression: Single, Polynomial Regression, Gradient Descent, ANOVA, Logistic Regression, Generalization: Ridge and Lasso regression.

Case Study: Media Company Case Study; Cynlate Bank Loan Disbursement.

Unit IV: 11 lecture hours

Neural networks: The perceptron algorithm, various activation functions and their differentiability, multilayer perceptrons, back-propagation, nonlinear regression, multiclass discrimination, training procedures, Bayesian Learning, Decision Tree

Unsupervised Learning: Uses of Unsupervised Learning; Data Clustering: K-means and Kernel K-means;

Unit V: **10 lecture hours**

Support vector machines: Functional and geometric margins, optimum margin classifier, constrained optimization, Lagrange multipliers, KKT conditions, soft margins, kernels.
Dimensionality Reduction: Feature Selection, Principle Component Analysis (PCA).

Text Books:

1. Artificial Intelligence – A Modern Approach, Second Edition, S. Russel and P. Norvig Pearson Education, 2003.
2. Artificial Intelligence, Ritch& Knight, TMH
3. "Machine Learning", 1st Edition, Tom M. Mitchell, McGraw-Hill Series In Computer Science

Reference Books:

1. Artificial Intelligence; Structures for Complex Problem Solving, Fourth edition, G. Lugar, Pearson Education, 2002
2. Artificial Intelligence: A New Synthesis, Nils J. Nilsson, Morgan Kaufmann Publishing, Inc., Year 1998
3. "INTRODUCTION TO MACHINE LEARNING", 2005 Edition, Nils J Nillsson, Morgan Kaufmann
4. "Foundations of Machine Learning", 2012 Edition, Mehryar Mohri, Afshin Rostamezadeh, Ameet Talwalkar, The MIT Press
5. Python Data Science Handbook Essential Tools for Working with Data", 1st Edition, Jake Vander Plas, O'Reilly

OLMCA306T	**Fundamental of Cloud Computing (Elective-1)**	**L**	**T**	**P**	**C**
Version 1.0	**Contact Hours -45**	**3**	**0**	**0**	**3**
Pre-requisites/Exposure	**DBMS, Java, Python, Computer Networking**				
Co-requisites	**--**				

Course Objectives:

- To introduce cloud computing-based programming techniques and cloud services.
- To introduce concepts and security issues of cloud paradigm.
- To impart the fundamentals of virtualization techniques.

Course Outcomes:

On completion of this course, the students will be able to

- CO1. How to provide Flexible and scalable infrastructures.
- CO2. Organize process to reduce implementation and maintenance costs.
- CO3. The case studies will help us to understand more of practice of cloud computing in the market.
- CO4. Determine flexible and scalable infrastructure suitable to the organizational need.
- CO5. Comparison of cost-wise solution to the problem and selecting the best solution for the problem suggested to the organization.

Catalogue Description:

This course focuses on concepts of cloud, fundamental building blocks like Resource Consolidation, Hypervisor, VM etc. and the cloud service models. It gives students the insight into how to build clouds. And provides practices on building the cloud. It also gives exposure to Public and Privacy Clouds. It gives students the future directions in cloud domain.

Course Content:

Unit I: 08 lecture hours

Data communication Components: Overview, Roots of Cloud Computing, Layers and Types of Cloud, Desired Features of a Cloud, Benefits and Disadvantages of Cloud Computing, Cloud Infrastructure Management, Infrastructure as a Service Providers, Platform as a Service Providers, Challenges and Risks.

Unit II: 10 lecture hours

Working with Cloud- Infrastructure as a Service: conceptual model and working Platform as a Service: conceptual model and functionalities Software as a Service: conceptual model and working Technologies and Trends in Service provisioning with clouds.

Service management, Computing on demand, Identity as a Service, Compliance as a Service

Unit III: 6 lecture hours

Abstraction and Virtualization: Introduction to Virtualization Technologies, Load Balancing and Virtualization, Understanding Hyper visors, Understanding Machine Imaging, Porting Applications, Virtual Machines Provisioning and Manageability, Virtual Machines Manageability, Virtual Machine Migration Services, Virtual Machine Provisioning and Migration in Action, Provisioning in the Cloud Context.

Unit IV: 10 lecture hours

Cloud Infrastructure and Cloud Resource: Management Architectural Design of Compute and Storage Clouds, Layered Cloud Architecture Development, Design Challenges, Inter Cloud Resource Management, Resource Provisioning and Platform Deployment, Global Exchange of Cloud Resources., Administrating the

Cloud, Cloud Management Products, Emerging Cloud Management Standards.

Unit V: **11 lecture hours**

Cloud Security: Security Overview, Cloud Security Challenges and Risks, Software-as-a Service Security, Cloud computing security architecture: Architectural Considerations, General Issues Securing the Cloud, Securing Data, Data Security, Application Security, Virtual Machine Security, Identity and Presence, Identity Management and Access Control, Autonomic Security, Storage Area Networks, Disaster Recovery in Clouds.

Text Books:

1. Rajkumar Buyya et. el., Cloud Computing: Principles and Paradigms, Wiley India Edition 2.
Sosinsky B., "Cloud Computing Bible", Wiley India

Reference Books:

1. Mastering Cloud Computing by Rajkumar Buyya, C. Vecchiola & S. Thamarai SelviMcGRAW Hill Publication
2. Miller Michael, "Cloud Computing: Web Based Applications that Change the Way You Work and Collaborate Online", Pearson Education India
3. Velte T., Velte A., Elsenpeter R., "Cloud Computing – A practical Approach", Tata McGrawHill

OLMCA305P	**Artificial Intelligence and Machine Learning Lab**	**L**	**T**	**P**	**C**
Version 1.0	**Contact hours -30**	**0**	**0**	**3**	**2**
Pre-requisites/Exposure	**Data Structure and Python Basics**				
Co-requisites	**--**				

Course Objectives:

- To help students gain practical insights of AI Algorithm through functional programming.
- To enable students, communicate with clarity and precision of ML Algorithm.
- To give the students a perspective enhancement of present system.
- To enable students to make a comparative study and further improvement.

Course Outcomes:

On completion of this course, the students will be able to

- Implement and Evaluate different search strategies using Prolog.
- Execute and Memorize and different various libraries and the most frequently used functions, methods, constants required for the implementation of any machine learning.
- Implement and Appraise Linear and Logistic Regression and Classify using K-NN for smaller dataset.

- Implement clustering algorithm and judge the appropriate clustering method for a particular dataset.
- Also, to design Artificial Neural Network for different dataset and to classify for multiclass datasets. Implement Decision Tree and Naïve Bayes classifier, Design Linear SVM and appraise.

Catalogue Description:

Every laboratory course brings an open world to a student. It helps the most in exploring and innovating. In Artificial Intelligence and Machine Learning Lab all experiments are given based on real-life problems. Through this kind of practice students become more analytic more inclined to practical thinking. Also, this course brings inquisitiveness to the students. This course is a rationale to the advance courses such as Artificial Neural Network and Deep Learning", "Soft Computing", etc. First Part of this course is the implementation of some important Artificial intelligence aspects such as Agents, Knowledge Representation and Planning. The later part implements all major Machine Learning algorithms with the online datasets.

Course Content:

Experiments:

1. Introduction to TensorFlow:
2. Introduction;
3. Installation; Introduction to Tensors – Variable, Constants; Data Flow Graph; TensorBoard; Mathematics with TensorFlow.
4. Starting with Machine Learning using TensorFlow:
5. Linear Regression (Lasso and Ridge Regression, Elastic Net Regression)
6. Dataset loading
7. Gradient Descent Algorithm
8. Accuracy
9. Optimization
10. ROC and AUROC Curve generation
11. Nearest Neighbour Model (K-NN) Classifier
12. Data Clustering (K-Means, K-Medoid, Hierarchical Clustering)
13. Artificial Neural Network
14. Introducing Neural Networks
15. TensorFlow implementation of Single Layer Perceptron using logistic regression
16. Building the model
17. Fit the model
18. Test evaluation
19. TensorFlow implementation of Multi-Layer Perceptron
20. Multi-Layer Perceptron classification
21. Build the model

22. Fit the model
23. Test evaluation
24. Multi-Layer Perceptron function approximation
25. Build the model
26. Fit the model
27. Test evaluation
28. Bayesian Method implementation using TensorFlow
29. Decision Tree
30. Implementation of ID3 algorithm using Tensorflow
31. Support Vector Machine (SVM)
32. Linear SVM
33. Reduction to Linear Regression
34. SVM Kernels in TensorFlow
35. Implementation of a Non-Linear SVM
36. Implementation of a Multi-Class SVM
37. Principle Component Analysis using TensorFlow
38. Linear Dependence and Span
39. Norms
40. Special Kinds of Matrices and Vectors
41. Eigen decomposition
42. Singular Value Decomposition
43. The Moore-Penrose Pseudoinverse
44. The Trace Operator.
45. The Determinant

Text Books:

G. Zaccone, Getting started with TensorFlow: Get up and running with the latest numerical computing library by google and dive deeper into your data! Community experience distilled, Packt Publishing, 2016.

A. G´eron, Hands-on machine learning with SciKit-Learn, Keras, And TensorFlow: Concepts, tools, and techniques to build intelligent systems, O'Reilly Media, Incorporated, 2019.

Reference Books:

"Python Data Science HandbookEssential Tools for Working with Data", 1st Edition, Jake VanderPlas, O'Reilly

OLMCA306P	Foundation of Cloud Computing Lab	L	T	P	C
Version 1.0	Contact Hours -45	0	0	3	2
Pre-requisites/Exposure	DBMS, Java, Python				
Co-requisites	--				

Course Objectives:

- To understand the installation of hypervisors.
- To understand the installation of different cloud simulation tools and cloud setup tools.
- To deploy cloud services.

Course Outcomes:

On completion of this course, the students will be able to

- CO1. Describe the key concepts and technologies in cloud computing.
- CO2. Evaluate cloud computing technologies and platforms in the context of the needs of a specific application
- CO3. Design data storage components for cloud-based software systems.
- CO4. Assess and monitor resource use of applications in virtualized environments
- CO5. Design, implement, and deploy cloud applications for current cloud platforms
- CO6. Evaluate privacy and security issues for cloud infrastructure and cloud applications

Catalogue Description:
This course introduces students to fundamentals of cloud computing and software development for cloud platforms. It covers topics such as virtualization, architecture of cloud systems, programming for the cloud, resource management, as well as privacy and security issues. Students gain practical experience developing applications for cloud platforms through a series of hands-on assignments.

Course Content:
Experiment 1: Introduction to cloud computing
Experiment 2: Hands on creation of virtual machine using computer server.
Experiment 3: Design virtual machine
Experiment 4: Key based authentication and login virtual machine from the host machine
Experiment 5: Create Backend logic to communication with frontend app using Ajax
Experiment 6: Using Backend logic setup communication with frontend app using Ajax
Experiment 7: Create SQL DB and design schema for user session 265. Login using username and password and validate in SQL

Experiment 8: Procedure to setup one Hadoop Cluster Access the Hadoop using API's from the application and show the data

Experiment 9: Demonstrate the use of map/reduce using simple program 269. AWS Free Tier Account Creation

Experiment 10: In AWS account enabling Multi-Factor Authentication to Secure Your Access and create your First Linux Instance

In AWS create your First EC2 windows instance In AWS assign Elastic IP Addresses to Instance (Static IP Address)

Text Books:

1. Barrie Sosinsky, "Cloud Computing Bible", Wiley India Edition.
2. Anthony Velte, tobyVelte, Robert Elsenpeter, "Cloud Computing – A Practical Approach", Tata McGraw-Hill Edition.

OLMCA307	**Natural Language Processing and Its Application (Elective -II)**	**L**	**T**	**P**	**C**
Version 1.0	**Contact Hours -45**	**3**	**0**	**0**	**3**
Pre-requisites/Exposure	**Computer Programming with python, Computer Programming with Python Lab**				
Co-requisites	**-**				

Course Objectives:

- To understand key concepts from NLP are used to describe and analyse language
- To understand semantics and pragmatics of language for processing
- To apply structured semantic models on information retrieval and natural language applications.

Course Outcomes:

On completion of this course, the students will be able to

- CO1. Recall linguistic phenomena and an ability to model them with formal grammars.
- CO2. Illustrate proper experimental methodology for training and evaluating empirical NLP systems
- CO3. Identify natural language processing techniques to process speech and analyse text.
- CO4. Examine algorithms of natural language processing CO5. Evaluate different language modeling Techniques.

Catalogue Description:

This course introduces the fundamental concepts and techniques of natural language processing (NLP). Students will gain an in-depth understanding of the computational properties of natural languages and the commonly used algorithms for processing linguistic information. The course examines NLP models and algorithms using both the traditional symbolic and the more recent statistical approaches.

Course Content:

Unit I: **5 lecture hours**

Introduction: Context - Classical Toolkit - Text Pre-processing – Tokenization – Sentence Segmentation

Lexical Analysis: Finite State Morphonology Paradigm based Lexical Analysis - Syntactic Parsing – CockeKasami-Younger Algorithm – Deductive Parsing – LR Parsing – Constraint based Grammars – Issues in Parsing Semantic Analysis: Theories and approaches to Semantic Representation – Fine Grained Lexical

Case studies - Natural Language Generation – Components of a Generator – Approaches to Text Planning – Linguistic Component.

Unit II: **11 lecture hours**

Corpus Size, Representation, Sampling – Data Capture – Corpus Markup and Annotation – Multilingual Corpora – Multimodal Corpora -Corpus Annotation Types

Morphosyntactic Annotation – Treebanks: Syntactic, Semantic, and Discourse Annotation - Process of Building Treebanks - Applications of Treebanks - Searching Treebanks.

Fundamental Statistical Techniques: Binary Linear Classification – One-versus-All Method for MultiCategory Classification - Maximum Likelihood Estimation - Generative and Discriminative Models - Mixture Model and EM - Sequence Prediction Models.

Part-of-Speech Tagging: General Framework – POS Tagging Approaches – Other Statistical and Machine Learning Approaches.

Statistical Parsing: Basics - Probabilistic Context-Free Grammars - Generative Models – Discriminative Models - Beyond Supervised Parsing.

Unit III: **10 lecture hours**

Multiword Expressions (MWE): Linguistic Properties, Types, Classification of MWEs – Research Issues

Methods of Word Similarity – Normalized Web Distance Method – Kolmogorov Complexity – Information Distance – Normalized Web Distance – Applications –

Word Sense Inventories and Problem Characteristics – Applications of Word Sense Disambiguation – Approaches to Sense Disambiguation: Supervised, Lightly Supervised and Unsupervised.

Unit IV: 10 lecture hours

Modern Speech Recognition: Architectural Components – Historical Developments – Speech Recognition Applications – Technical Challenges and Future Research Directions

Alignment: Basics – Sentence Alignment – Character, Word, Phrase Alignment – Structure and Tree Alignment – Biparsing and ITG Tree Alignment

Statistical Machine Translation: Approaches – Language Models – Parallel Corpora – Word Alignment – Phrase Library – Translation Models – Search Strategies – Research Areas.

Unit V: 09 lecture hours

Information Retrieval – Indexing – IR Models – Evaluation and Failure Analysis

Natural Language Processing and Information Retrieval – Question Answering – Generic Question Answering System – Evaluation of Question Answering system – Multilingualism in Question Answering System

Recent trends and Related Works – Information Extraction – IE with Cascaded Finite State Transducers – Learning based Approaches in IE – Report generation – Emerging Applications of Natural language Generation in Information – Biomedical Text Mining – Sentiment Analysis and Subjectivity.

Text Books:

1. Daniel Jurafsky and James H. Martin Speech and Language Processing (2nd Edition), Prentice Hall; 2 editions, 2008

2. Foundations of Statistical Natural Language Processing by Christopher D. Manning and Hinrich Schuetze, MIT Press, 1999

Reference Books:

1. James Allen, Natural Language Understanding, Addison Wesley; 2 edition 1994

2. Steven Bird, Ewan Klein and Edward Loper Natural Language Processing with Python, O'Reilly Media; 1 edition, 2009

OLMCA308	Data Warehousing & Data Analytics (Elective -II)	L	T	P	C
Version 1.0	Contact Hours -45	3	0	0	3
Pre-requisites/Exposure	DBMS, Java, Python, Computer Networking				
Co-requisites	--				

Course Objectives:

- To be familiar with mathematical foundations of data mining tools.
- To understand and implement classical models and algorithms in data warehouses and data mining
- To characterize the kinds of patterns that can be discovered by association rule mining, classification and clustering.
- To understand the Big Data Platform and its Use cases
- To provide an overview of Apache Hadoop
- To provide HDFS Concepts and Interfacing with HDFS
- To understand Map Reduce Jobs

Course Outcomes:

On completion of this course, the students will be able to

- CO1. Understand the functionality of the various data mining and data warehousing component.
- CO2. Appreciate the strengths and limitations of various data mining and data warehousing models.
- CO3. Explain the analysing techniques of various data.
- CO4. Identify Big Data and its Business Implications.
- CO5. List the components of Hadoop and Hadoop Eco-System

Catalogue Description:

This course will introduce the concepts of data ware house and data mining, which gives a complete description about the principles, used, architectures, applications, design and implementation of data mining and data ware housing concepts along with the added advantage of data analytics. Which will familiarize students with big data analysis as a tool for addressing substantive research questions. The course begins with a basic introduction to big data and discusses what the analysis of these data entails, as well as associated technical, conceptual and ethical challenges. Strength and limitations of big data research are discussed in depth using real-world examples.

Course Content:

Unit I: 09 lecture hours

Data Warehouse Fundamentals: Introduction to Data Warehouse, Data Warehouse Environment, OLTP Systems; Differences between OLTP Systems and Data Warehouse: Characteristics of Data Warehouse; Functionality of Data Warehouse: Advantages and Applications of Data Warehouse; Advantages, Applications Planning and Requirements: Introduction: Planning Data Warehouse and Key Issues: Planning and Project Management in constructing Datawarehouse: Data Warehouse Project; Data Warehouse development Life Cycle, Kimball Lifecycle Diagram, Requirements Gathering Approaches: Team organization, Roles, and Responsibilities:

Unit II: 6 lecture hours

Data Warehouse Architecture: Introductions, Components of Data warehouse Architecture: Data Warehouse vs Data Mart, Component based architecture, Dimensional Modelling: Introduction: E-R Modelling: Dimensional Modelling: E-R Modelling VS Dimensional Modelling: Data Warehouse Schemas; Star Schema, Inside Dimensional Table.

Unit III: 8 lecture hours

Bring data into data warehouse: ETL, Role of data transformation, Data Warehouse & OLAP: Introduction: What is OLAP? Characteristics of OLAP, Steps in the OLAP Creation Process, Advantageous of OLAP: What is Multidimensional Data: OLAP Architectures; MOLAP, ROLAP, HOLAP.

Unit IV: 10 lecture hours

Data pre-processing : Data cleaning , Data transformation , Data mining knowledge representation, Data Mining Algorithms: Association Rules, Classification, Prediction Data Definitions and Analysis Techniques Elements, Variables, and Data categorization Levels of Measurement Data management and indexing Introduction to statistical learning Descriptive Statistics: Measures of central tendency, Measures of location of dispersions, Basics and Usage of Rapidminer and Weka as mining tool.

Unit V: 12 lecture hours

Basic analysis techniques Statistical hypothesis generation and testing Chi-Square test t-Test Analysis of variance Correlation analysis Maximum likelihood test. Foundation of Data Analytics: - Introduction ,Evolution , Concept and Scopes , Data , Metrics and Data classification, Data Reliability & Validity, Problem Solving with Analytics, Different phases of Analytics in the business and Data science domain, Descriptive Analytics, Predictive Analytics and Prescriptive Analytics , Different Applications of Analytics in Business, Data analysis techniques: Regression analysis; Classification techniques; Clustering: Association rules analysis. Case studies and projects: Understanding business scenarios; Feature engineering and visualization; Case Studies: Finance, Car Sales, Bank Customer Complaints, etc.

Text Books:

1. Data Ware Housing Fundamentals, Pualraj Ponnaiah, Wiley Student Edition
2. Data Mining-Concepts and Techniques- Jiawei Han, Micheline Kamber, Morgan Kaufmann

Publishers, Elsevier, 2 Edition, 2006.
3. Data Warehousing, Data Mining, and OLAP, Alex Berson, Stephen J. Smith, MGH, 1998.
4. Data Analytics: Become A Master In Data Analytics, Richard Dorsay, CreateSpace Independent Publishing Platform.

Reference Books:

1. The Data Ware House Life Cycle Toolkit- Ralph Kimball, Wiley Student Edition.
2. Data Mining Introductory and advanced topics –MARGARET H DUNHAM, PEARSON EDUCATION

OLMCA401T	**Public Blockchain**	**L**	**T**	**P**	**C**
Version 1.2	**Contact Hours – 45**	**3**	**0**	**0**	**3**
Pre-requisites/Exposure	**Crypto currency and computer security basics**				
Co-requisites	**-**				

Course Objectives:

- To gain knowledge about the building blocks of blockchain ethereum.
- To enable students to install and configure Mist browser,
- To give the students a perspective to learn the basics of EVM and Solidity programming.
- To enable students acquire knowledge about smart contract and tokens.

Course Outcomes:

On completion of this course, the students will be able to

- CO1. Understand the basics of blockchain ethereum.
- CO2. Explain the procedure of installation of Mist browser and its configuration.
- CO3. Explain the role of Ethereum protocol in Banking.
- CO4. Understand the basics of Solidity programming primer.
- CO5. Understand the utility of smart contract and token.
- CO6. Evaluate the ancestry of blocks and transactions.

Catalogue Description:

This course is the definitive introduction to permissioned blockchain for the students. Beyond the technology, this course will introduce you to some of the philosophy behind decentralization and why there is so much excitement around it.

During the tenure of the course, the students will be introduced to blockchain and the technology behind it. In the later modules, the topics beyond bitcoin will be taken up and delve deeper into a next-generation blockchain called Ethereum to introduce students to what modern blockchains can do.

Course Content:

Unit I: 6 lecture hours

Bridging the Blockchain Knowledge Gap: What Ethereum Does, Three Parts of a Blockchain, Ether as a Currency and Commodity, The Power Is in the Protocol, You Can Build Trustless Systems, What Smart Contracts: Objects and Methods for Value, Just Add Commerce, Content Creation; Where's the Data? :What Is Mining, Ether and Electricity Prices; EVM: The Mist Browser, Browser vs. Wallet or Keychain;What Ethereum Is Good For: State of Smart Contract Development

Unit II: 8 lecture hours

The Mist Browser: introduction, The Bank Teller Metaphor, In Cryptocurrency, You Hold Your Own Assets, Visualizing Ethereum Transactions, Breaking with Banking History, How Encryption Leads to Trust, System Requirements, more about Eth.guide and This Book, Tools for Developers, CLI Nodes, Recommended: Using Parity with Geth, Finally, into the Mist! , Downloading and Installing Mist, Configuring Mist, Finding Your New Address, Sending and Receiving Ether, Understanding Ethereum Account Types, Backing Up and Restoring Your Keys, Using Paper Wallets, Using Mobile Wallets, Working with Messages and Transactions, So, What Is a Blockchain? , Paying for Transactions, Understanding Denominations, Getting Ether, Anonymity in Cryptocurrency, Blockchain Explorers .

Unit III: 8 lecture hours

The EVM: The Role of the Ethereum Protocol in Banking, What the EVM Does, EVM Applications Are Called

Smart Contracts, The Name "Smart Contracts, Understanding State Machines, Digital vs. Analog, "Statements", Data's Role in State, How the Guts of the EVM Work, The EVM Constantly Checks for Transactions, creating a Common Machine Narrative of What Happened, Cryptographic Hashing, Hash Functions (or Hash Algorithms),
Blocks: The History of State Changes, Block Time, Drawbacks of Short Blocks, "Solo Node" Blockchain, Distributed Security, Mining's Place in the State Transition Function, Renting Time on the EVM, Gas: Why Is Gas So Important, Why Isn't Gas Priced in Ether, Fees as Regulation, Working with Gas

Unit IV: 8 lecture hours

Solidity Programming Primer: Global Banking Made (Almost) Real, Extra-Large Infrastructure, Worldwide

Currency, Complementary Currency, The Promise of Solidity, Browser Compiler, Learning to Program the EVM, Easy Deployment, The Case for Writing Business Logic in Solidity, Code, Deploy, Relax, Design Rationale, Writing Loops in Solidity, Expressiveness and Security, The Importance of Formal Proofs, Historical Impact of a Shared Global Resource, How Attackers Bring Down Communities, Hypothetical Attack Written in Solidity, Automated Proofs to the Rescue, Determinism in Practice, Lost in Translation,

Unit V: 7 lecture hours

Smart Contracts and Tokens: EVM as Back End, Smart Contracts to Dapps, Assets Backed by Anything, Bartering with Fiat Currency, Ether as Glass Beads, Cryptocurrency Is a Measure of Time, Asset Ownership and Civilization, Coins are Collectibles, The Function of Collectibles in Human Systems, Early Counterfeiting, Jewellery and Art as Money , The Step Toward Banknotes , Platforms for High-Value Digital Collectibles , Tokens Are a Category of Smart Contract , Tokens as Social Contracts, Tokens Are a Great First App, Creating a Token on the Testnet , Getting Test Ether from the Faucet, Registering Your Tokens , Deploying Your First Contract, Same House, Different Address , Playing with Contracts .

Unit VI: 8 lecture hours

Mining Ether: Ether's Source, Mining, Self-Regulation, and the Race for Profit, How Proof of Work Helps Regulate Block Time, What's Going on with the DAG and Nonce, Making Fast Blocks Work, How Ethereum Uses Stale Blocks, Uncle Rules and Rewards, The Difficulty Bomb, Miner's Winning Payout Structure, Limits on Ancestry, The Block Processing Play by Play, Evaluating the Ancestry of Blocks and Transactions, How Ethereum and Bitcoin Use Trees, Merkle-Patricia Trees, Contents of an Ethereum Block Header, Forking, Installing Geth on macOS

Text Books:

1. Mayukh Mukhopadhyay - Ethereum smart contract development_ build blockchain-based decentralized applications using Solidity-Packt Publishing (2018)

2. Chris Dannen (auth.) - Introducing Ethereum and Solidity_ Foundations of Cryptocurrency and Blockchain Programming for Beginners-Apress (2017)

3. Mastering Bitcoin: Programming The Open Blockchain, Andreas M. Antonopoulos, O'Reilly, ISBN: 9789352135745.

Reference Books:

1. Ethereum for Architects and Developers: With Case Studies and Code Samples in Solidity by Debajani Mohanty

2. Blockchain for Business by Jai Singh Arun

3. Blockchain Applications: A Hands-on Approach by Arshdeep Bahga and Vijay K. Madisetti, ISBN: 9780996025560.

OLMCA401P	Public Blockchain Lab	L	T	P	C
Version 1.0	**Contact Hours -30**	**0**	**0**	**3**	**2**
Pre-requisites/Exposure	**Crypto currency and computer security basics**				
Co-requisites	**--**				

Course Outcomes:

On completion of this course, the students will be able to CO1**.**

Understand the basics of Solidity programming.
CO2**. Apply** the decision making constructs and loops to perform conditional execution. CO3**. Apply** the various types of inheritance in Solidity programming.
CO4**. Distinguish** between function and contract polymorphism. CO5**.**
Explain and apply error handling use cases.

Catalog Description:

This course is the definitive introduction to permissioned blockchain for the students. Beyond the technology, this course will introduce you to some of the philosophy behind decentralization and why there is so much excitement around it.
During the tenure of the course, the students will be introduced to blockchain and the technology behind it. In the later modules, the topics beyond bitcoin will be taken up and delve deeper into a next-generation blockchain called Ethereum to introduce students to what modern blockchains can do.

Course Content:

Experiments:

1	Write a Solidity program to create a smart contract.
2	Solidity program to demonstrate the use of decision making statements.
3	Solidity program to demonstrate the use of loops.
4	Solidity program to demonstrate the creation of an event.
5	Solidity program to demonstrate the use of pure and view functions.
6	Solidity program to demonstrate the use of different types of inheritance.
7	Solidity program to demonstrate the use of abstract contract.

8	Solidity program to demonstrate the use of Function polymorphism.
9	Solidity program to demonstrate the use of contract polymorphism.
10	Solidity program to demonstrate the error handling.

Text Books:

1. Mayukh Mukhopadhyay - Ethereum smart contract development_ build blockchain-based decentralized applications using Solidity-Packt Publishing (2018)
2. Chris Dannen (auth.) - Introducing Ethereum and Solidity_ Foundations of Cryptocurrency and Blockchain Programming for Beginners-Apress (2017)
3. Mastering Bitcoin: Programming The Open Blockchain, Andreas M. Antonopoulos, O'Reilly, ISBN: 9789352135745.

Reference Books:

1. Ethereum for Architects and Developers: With Case Studies and Code Samples in Solidity by Debajani Mohanty

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Examination Scheme:

Components	Internal Assessment	ETE
Weightage (%)	**50**	**50**

ADAMAS UNIVERSITY

SCHOOL OF ENGINEERING AND TECHNOLOGY END-SEMESTER EXAMINATION: JULY 2020

Name of the Program: MCA Semester: IV Stream: CSE

PAPER TITLE: Public Blockchain Lab PAPER CODE: OLMCA401P

Maximum Marks: 50 Time duration: 3 hours
Total No of questions: 5 Total No of Pages: 01

Instruction for the Candidate:

1. At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, and Date of Exam.
2. All parts of a Question should be answered consecutively. Each Answer should start from a fresh page.
3. Assumptions made if any, should be stated clearly at the beginning of your answer.

Section A (Answer All the Questions) (5 x 10 = 50)			
1.	**Develop** a Solidity program to create a smart contract.	**AP**	**CO1**
2.	**Develop** Solidity program to demonstrate the use of decision making statements.	**AP**	**CO2**
3.	**Develop** Solidity program to demonstrate the use of loops.	**AP**	**CO2**
4.	**Develop** Solidity program to demonstrate the creation of an event.	**AP**	**CO4**
5.	**Develop** Solidity program to demonstrate the error handling.	**AP**	**CO5**

OLMCA402T	**Cyber Security and Cryptography**	**L**	**T**	**P**	**C**
Version 1.0	**Contact Hours – 45 Hours**	**3**	**0**	**0**	**3**
Pre-requisite/Exposure	**Computer Network**				
Co-requisite	**NIL**				

Course Objectives:

281. To understand basics of Cyber Security.
282. To be able to secure a message over insecure channel by various means.
283. To learn about how to maintain the Confidentiality, Integrity and Availability of a data.

284. To understand various protocols for cyber security to protect against the threats in the cyber space.

Course Outcomes:

On the completion of this course the student will be able to

285. **Define** the basics of Cyber security and types of existing malware.
286. **Understand** and identify the cyber security breaches and cyber attacks.
287. **Explain** the preventive measures for cyber fraud
CO4. **Examine** the basics concept of Social Network Security and Web Security.
CO5. **Appraise** the recent threats and attacks against the technical world and design some effective prevention scheme.

Course Description:

Effective network communication is an integral part of technical life. Cyber Security and Cryptography is a process of securing the data communication, all the algorithms, messages etc. In this course you will learn the basics of cyber security and how to prevent and detect any sort of cyber attacks. The course begins with a detailed discussion of different types of malware, cyber security breaches and cyber attacks. Throughout the course participants will be exposed to many exciting open problems in the field and work on fun (optional) programming projects. In the course cyber security we will cover more advanced security tasks such as zero-day vulnerability, privacy mechanisms, and other forms of defense against hackers

Course Content:

Unit-I	**09 Lecture Hours**
Cyber security fundamentals: Definition of cyber space, cyber security, importance of cyber security, hacker, related case studies Different encryption technique,DES,AES,S and P block **Types of malware:**Worm, virus, spyware, Trojan, related case studies	
Unit-II	**09 Lecture Hours**
Cyber security breaches: Phishing, identity theft, harassment, cyber stalking, related case studies **Types of cyber attacks:** Password attacks, Denial of service attacks, Passive attack, Penetration testing, related case studies	
Unit-III	**09 Lecture Hours**
Prevention tips: Design a strong password, Two-step verification, Question validity of web-sites, related case studies **Mobile protection:** No credit card numbers, place lock on phone, don't save passwords, related case studies	

Unit-IV	09 Lecture Hours
Social network security: Security measures like not revealing location, keeping birth-date hidden, having private profile, not linking accounts, related case study **Prevention software:** Firewalls, Virtual private network, Anti-virus & anti-spyware, Routine updates, related case study	
Unit-V	**09 Lecture Hours**
Critical cyber threats: Critical cyber threats, cyber terrorism, cyber-warfare, cyber-espionage, Cyber laws,Cyber forensic **Defense against hackers:** Cryptography, digital forensics, intrusion detection, legal recourse, related course study	
Text Books: "Network Security: Private Communication in Public World", Charlie Kaufman, RadiaPerman, Mike Speciner, 2nd Edition, Pearson Education, 2011. **Reference Books:** "Cryptography and Network Security", Atulkahate, TMH, 2003. "Cyber Security", Nina Godbole, WILEY, 2003.	

Modes of Evaluation: Quiz/Assignment/Presentation/Extempore/ Written Examination

Examination Scheme:

Components	Mid Term	Class Assessment	End Term
Weightage (%)	**20**	**30**	**50**

MODEL QUESTION PAPER

	ADAMAS UNIVERSITY END SEMESTER EXAMINATION (Academic Session: 2022 – 23)		
Name of the Program:	MCA	**Semester:**	V
Paper Title:	Cyber Security and Cryptography	**Paper Code:**	OLMCA402T
Maximum Marks:	50	**Time Duration:**	3 Hrs
Total No. of Questions:	**17**	**Total No of Pages:**	02

(Any other information for the student may be mentioned here)	At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam. All parts of a Question should be answered consecutively. Each Answer should start from a fresh page. Assumptions made if any, should be stated clearly at the beginning of your answer.

Ques No.	Question	Knowledge Level	Course Outcome
	Group A : Answer ALL the questions (5 x 1 = 5)		
1	**Define** cyber security.	**U**	**CO1**
2	**Explain** briefly about phishing.	**An**	**CO2**
3	**Define** cyberspace.	**U**	**CO3**
4	**Elucidate** VPN?	**U**	**CO4**
5	**What** is cyber espionage?	**R**	**CO5**
	Group B : Answer ALL the questions (5 x 2 = 10)		
6	**a)** Explain global perspective on cyber crime.	**U**	**CO1**
	(OR)		
	b) Explain about different types of malware.		
7	Explain a use case scenario about identity theft.	**An**	**CO2**
	(OR)		
	Explain a use case scenario about denial of service attack.		
8	Discuss about the significance of two-step verification.	**U**	**CO3**
	(OR)		
	Explain how you will protect a mobile's security with basic precautionary steps.		
9	Discuss the various social network security measures to protect a social media account from getting compromised.	**An**	**CO4**
	(OR)		
	Compare and contrast anti-virus and anti-spyware.		
10	Write short notes on cyber warfare.	**U**	**CO5**
	(OR)		
	Elucidate about the problem of intrusion detection.		
	Group C : Answer ALL the questions (7 x 5 =35)		

11	Explain password sniffing with an example. **(OR)** **b)** Explain the classification of cyber crimes.	**U**	**CO1**
12	Define attack and explain it with the help of an example. **(OR)** Discuss cyber stalking and how it impacts the security of an individual.	**U**	**CO2**
13	Mention the tips for safety and security measures to be followed in a cyber cafe. **(OR)** What are the threats through lost and stolen devices?	**U**	**CO3**
14	What are the steps to be followed for protection against Trojan horse and backdoors? **(OR)** How does tunnelling take place in VPN? Explain the advantages of VPN.	**An**	**CO4**
15	How can Firewall be used as an effective security measure in an	**Ap**	**CO4**
	organization? **(OR)** Discuss about the benefits of having a private profile in social media.		
16	Write short notes on cyber espionage. **(OR)** Discuss the significance of digital forensics.	**U**	**CO5**
17	Elucidate the characteristics of cryptography. **(OR)** Explain the importance of Intrusion detection system in cyber security.	**U**	**CO5**

Note: The Sample prepared by assuming 5 COs in a course, considering one CO for one Module.
297. If the COs are higher in numbers that can be managed by equating sub-divisional questions
298. If the COs are lower in numbers, the questions can be increased by equating the number of Cos

OLMCA402P	**Cyber Security and Cryptography Lab**	**L**	**T**	**P**	**C**
Version 1.0	**Contact Hours-30**	**0**	**0**	**3**	**2**
Pre-requisites/Exposure	**computer security basics**				
Co-requisites	**--**				

Course Objectives:

320. To gain knowledge about the building blocks of CRYPTHOGRAPHY
321. To enable students to install and configure different scanning tool
322. To give the students a perspective to learn the basics of security in programming.
323. To enable students acquire knowledge about cryptography technique..

Course Outcomes:

On completion of this course, the students will be able to CO1**.**

Understand the basics of CRYPTHOGRAPHY.
CO2**. Explain** the procedure of installation configure different scanning tool. CO3**.**
Explain the role of encryption in real life.
CO4**. Understand** the basics of Security programming primer.
CO5**. Understand** the utility of encryption in real life.
CO6**. Evaluate** the ancestry of cryptography technique...

Catalog Description:

This course is the definitive introduction to permissioned blockchain for the students. Beyond the technology, this course will introduce you to some of the philosophy behind decentralization and why there is so much excitement around it.
During the tenure of the course, the students will be introduced to blockchain and the technology behind it. In the later modules, the topics beyond bitcoin will be taken up and delve deeper into a next-generation blockchain called Ethereum to introduce students to what modern blockchains can do.

Course Content:

Experiments:

1	Write a Security program to create a ceaser cipher
2	WAP for substitution cipher
3	WAP for rail fence cipher
4	WAP for hill cipher
5	WAP for additive cipher
6	WAP for multiplicative cipher
7	WAP for DES
8	WAP for AES
9	WAP for message digest
10	Demonstrate intrusion detection system (ids) using any tool eg. Snort or any other s/w

Text Books:

1. Mayukh Mukhopadhyay - Ethereum smart contract development_ build blockchain-based decentralized applications using Solidity-Packt Publishing (2018)

2. Chris Dannen (auth.) - Introducing Ethereum and Solidity_ Foundations of Cryptocurrency and Blockchain Programming for Beginners-Apress (2017)

3. Mastering Bitcoin: Programming The Open Blockchain, Andreas M. Antonopoulos, O'Reilly, ISBN: 9789352135745.

Reference Books:

1. Ethereum for Architects and Developers: With Case Studies and Code Samples in Solidity by Debajani Mohanty

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Examination Scheme:

Components	Internal Assessment	ETE
Weightage (%)	**50**	**50**

Model Question Paper

ADAMAS UNIVERSITY

SCHOOL OF ENGINEERING AND TECHNOLOGY

END-SEMESTER EXAMINATION: JULY 2020

Name of the Program: MCA Semester: IV Stream: CSE
PAPER TITLE: Cyber security and Cryptography Lab PAPER CODE:
OLMCA402P Maximum Marks: 50 Time duration: 3 hours
Total No of questions: 5 Total No of Pages: 01

Instruction for the Candidate:

1. At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, and Date of Exam.
2. All parts of a Question should be answered consecutively. Each Answer should start from a fresh page.
3. Assumptions made if any, should be stated clearly at the beginning of your answer.

Section A (Answer All the Questions) (5 x 10 = 50)			
1.	WAP for substitution cipher	**AP**	**CO1**
2.	WAP for rail fence cipher	**AP**	**CO2**
3.	WAP for hill cipher	**AP**	**CO2**

4.	**Develop** A DES program to demonstrate the creation of an event.	**AP**	**CO4**
5.	**Develop** AES program to demonstrate security	**AP**	**CO5**

Examination Procedure

1. Introduction

The Office of the Controller of Examinations (CoE) is the statutory authority responsible for planning, coordinating, conducting, evaluating, and declaring the results of all examinations conducted by the University. The Office ensures that every examination is conducted with the highest standards of fairness, transparency, confidentiality, academic integrity, and regulatory compliance.

The examination ecosystem is supported by the University Management System (UMS) and follows well-defined Standard Operating Procedures (SOPs) covering the complete examination lifecycle—from examination planning to result publication and record archiving.

2. Examination Process

The examination process consists of three major phases:

- **Pre-Examination Activities**
- **Examination Conduct**
- **Post-Examination Activities**

A. Pre-Examination Activities

Prior to the commencement of the End Term Examinations for Online Learning (OL) programmes, the Office of the Controller of Examinations, in coordination with the Centre for Distance and Online Education (CDOE), shall undertake comprehensive planning and necessary preparatory activities to ensure the secure and seamless conduct of online proctored examinations.

The major pre-examination activities include:

- Preparation and publication of the Academic Calendar and End Term Examination Schedule.
- Verification of student eligibility based on registration, course enrolment, fee clearance, and fulfilment of the prescribed academic requirements.
- Collection, moderation, approval, and secure digital management of question papers from the respective Schools/Departments.
- Configuration and deployment of confidential question papers on the approved Online Examination Platform.
- Scheduling of online examination sessions, batch allocation, and examination window management.
- Generation and publication of electronic Admit Cards through the University Management System (UMS).
- Configuration of the online proctoring environment, including candidate authentication, identity verification, system compatibility checks, and mock tests, wherever applicable.

Controller of Examinations
ADAMAS UNIVERSITY

- Appointment of Centre Superintendent, Online Proctors, Technical Support Personnel, Flying Squad members (where applicable), and other authorized examination officials.
- Preparation and dissemination of examination guidelines, candidate instructions, login credentials, examination links, user manuals, and technical support details.
- Verification of examination platform readiness, server availability, cybersecurity measures, and contingency plans to ensure uninterrupted conduct of online examinations.

B. Examination Conduct

The Office of the Controller of Examinations (CoE), in coordination with the Centre for Distance and Online Education (CDOE), shall ensure the smooth, secure, transparent, and technology-enabled conduct of End Term Examinations for Online Learning (OL) programmes through the approved online proctored examination platform.

The examination process shall include:

- Secure deployment and controlled release of confidential digital question papers through the approved online examination platform.
- Candidate authentication and identity verification using the prescribed online verification mechanisms prior to commencement of the examination.
- Online attendance recording through system login authentication and examination platform monitoring.
- Continuous supervision of examinations by Online Proctors, Chief Superintendent, and authorized examination officials throughout the examination session.
- Real-time monitoring using AI-enabled and/or live remote proctoring tools to ensure compliance with the University's examination regulations and maintain academic integrity.
- Identification, reporting, and processing of unfair means cases, suspicious activities, and examination irregularities in accordance with the University's Examination and Evaluation Regulations.
- Secure submission of students' responses through the online examination platform, followed by verification, encryption, and transfer of examination data to the Office of the Controller of Examinations for evaluation and record management.
- Maintenance of complete digital audit trails, examination logs, proctoring reports, and recorded evidence to ensure transparency, traceability, and regulatory compliance.

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C. Post-Examination Activities

After completion of examinations, the Office of the CoE coordinates the evaluation and result processing activities.

These include:

- Distribution of answer scripts for evaluation.
- Marks entry through the University Management System.
- Verification of attendance and marks.
- Moderation wherever applicable.
- Result compilation.
- Result approval by the Competent Authority.
- Publication of Results and Grade Cards.
- Review, Scrutiny and Re-evaluation.
- Digital archiving of examination records.

3. Online Proctoring and Examination Monitoring

The Office of the Controller of Examinations (CoE), in coordination with the Centre for Distance and Online Education (CDOE), shall ensure secure, impartial, and efficient monitoring of online examinations through a structured allocation of proctoring and technical support responsibilities. The online proctoring framework is designed to uphold academic integrity, ensure regulatory compliance, and facilitate the smooth conduct of examinations.

Allocation of Online Proctoring Duties

Online proctoring duties shall be assigned based on:

- Availability of trained Online Proctors and examination personnel.
- Number of examination sessions and registered candidates.
- Equitable distribution of workload among proctors and technical staff.
- Programme- and course-specific examination requirements.
- Technical support requirements for online examination sessions.
- Availability of reserve Online Proctors and Technical Support Personnel to address contingencies and technical emergencies.

Examination Personnel

For the conduct of Online Learning (OL) End Term Examinations, the Office of the Controller of Examinations shall appoint, as applicable:

- Centre Superintendent
- Deputy Centre Superintendent

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- Online Proctors
- Technical Support Personnel
- System Administrators
- Flying Squad Members (for monitoring and quality assurance, where applicable)
- Helpdesk and Examination Support Staff

Online proctoring schedules, examination duty rosters, and technical support assignments shall be prepared centrally by the Office of the Controller of Examinations and communicated to all concerned officials prior to the commencement of each examination session. All examination personnel shall perform their assigned responsibilities in accordance with the University's Examination and Evaluation Regulations, ensuring fairness, transparency, confidentiality, and the integrity of the online examination process.

4. Responsibilities of Online Proctors

The Office of the Controller of Examinations (CoE) shall appoint Online Proctors to supervise and monitor the conduct of End Term Examinations for Online Learning (OL) programmes. Online Proctors shall ensure the integrity, confidentiality, fairness, and smooth conduct of examinations through continuous monitoring using the approved online proctoring platform.

A. Before Commencement of the Examination

The Online Proctor shall:

- Report to the designated online examination control room or monitoring portal at least 30 minutes before the commencement of the examination.
- Verify the operational readiness of the online examination platform and assigned proctoring dashboard.
- Review the list of candidates allotted for monitoring and ensure access to the required examination and proctoring tools.
- Verify candidate authentication procedures, including identity verification, system compatibility, and webcam/microphone functionality, wherever applicable.
- Ensure that all examination instructions, login credentials, and technical support mechanisms are available to the candidates before the commencement of the examination.
- Coordinate with the Technical Support Team to resolve any pre-examination technical issues.

B. During the Examination

The Online Proctor shall:

- Verify the identity of candidates using the approved online authentication and verification mechanisms.
- Monitor candidates continuously throughout the examination using AI-enabled and/or live remote proctoring tools.

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- Record online attendance through the examination platform and verify candidate login status.
- Ensure compliance with the University's Examination and Evaluation Regulations and maintain discipline throughout the examination session.
- Observe and report any suspicious activities, malpractice, unfair means, impersonation, unauthorized access, or violation of examination rules.
- Coordinate with the Chief Superintendent and Technical Support Team for timely resolution of technical issues affecting the examination.
- Prepare and submit reports of examination irregularities, if any, in accordance with the prescribed procedures.

C. After Completion of the Examination

The Online Proctor shall:

- Verify the successful submission of candidates' responses through the online examination platform.
- Confirm the completeness of attendance records, examination logs, and proctoring reports.
- Ensure that all digital examination records, including proctoring recordings and audit logs, are securely transferred to the Office of the Controller of Examinations.
- Report any pending technical issues or examination-related incidents to the Centre Superintendent immediately after the examination.
- Complete and submit the prescribed online proctoring report and other examination documentation as required by the Office of the Controller of Examinations.

5. Evaluation & Result Processing

The Office of the CoE follows a multi-level verification mechanism to ensure accuracy and transparency.

The process includes:

- Evaluation by approved examiners.
- Digital marks entry.
- Verification of marks.
- Attendance reconciliation.
- Grade computation.
- Moderation (where applicable).
- Result compilation.
- Approval by Competent Authority.
- Publication through UMS.

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Students may subsequently apply for:

- Review
- Scrutiny
- Re-evaluation

as per the University regulations.

6. Digital Examination Management

The Office of the CoE has progressively adopted digital technologies to improve efficiency and governance.

Major digital initiatives include:

- Examination Scheduling
- Student Eligibility Verification
- Online Admit Cards
- Automated Room Allocation
- Digital Invigilation Management
- Secure Question Paper Management
- Online Marks Entry
- Automated Result Processing
- Grade Card Generation
- Examination Analytics
- Digital Record Archival

These initiatives enhance transparency, reduce manual intervention, improve security, and ensure complete traceability throughout the examination lifecycle.

7. Internal Assessment (IA) Conduct

The University adopts a **Continuous Internal Assessment (CIA)** system to evaluate students throughout the semester. Internal Assessment is designed to assess students' continuous academic performance, conceptual understanding, practical skills, assignments, presentations, seminars, quizzes, laboratory performance, and other discipline-specific learning outcomes.

The Continuous Internal Assessment (CIA) for learners enrolled in Open and Distance Learning (ODL) programmes shall be conducted in accordance with the approved Academic Calendar and the applicable Programme Regulations. The assessment process shall adhere to the University's Examination and Evaluation Regulations and the UGC (Open and Distance Learning Programmes and Online Programmes) Regulations, as amended from time to time, ensuring fairness, transparency, academic integrity, and consistency in evaluation. The Office of the Controller of Examinations shall coordinate the assessment schedule, facilitate the submission and verification

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of Internal Assessment marks through the University Management System (UMS), and monitor compliance with the prescribed examination procedures and regulatory requirements .

Internal Assessment Components

The Internal Assessment may comprise one or more of the following components depending upon the programme regulations:

- Class Tests / Quizzes
- Assignments
- Presentations
- Case Studies
- Laboratory Performance
- Practical Records
- Viva-Voce
- Attendance (where applicable)
- Continuous Evaluation Activities

Internal Assessment Weightage

The weightage of Internal Assessment shall be as prescribed in the applicable Programme Regulations.

Typical weightages include:

Assessment Component	Weightage
Internal Assessment (IA)	**30%**

The exact distribution varies across programmes in accordance with the approved curriculum and Academic Regulations.

The Continuous Internal Assessment (CIA) marks awarded to learners shall be verified and approved by the respective Course Coordinator/Programme Coordinator, as applicable, before being submitted to the Office of the Controller of Examinations through the University Management System (UMS). The Office of the Controller of Examinations shall ensure the accuracy, completeness, and timely processing of the submitted assessment records in accordance with the prescribed regulations.

8. End Term Examination (TEE) Conduct

The End Term Examination (TEE) constitutes the final summative assessment of a course and is conducted under the direct supervision of the Office of the Controller of Examinations.

Mode of Conduct of End Semester Examination (OL):

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The End Semester Examination for Online Learning (OL) programmes shall be conducted in a secure, technology-enabled online proctored examination mode. Candidates shall appear remotely through the approved online examination platform using AI-enabled and/or live remote proctoring mechanisms to ensure fairness, transparency, academic integrity, and compliance with the applicable University and UGC-ODL & OL Regulations.

The TEE evaluates the attainment of Course Outcomes (COs) and Programme Outcomes (POs) through a standardized, confidential, and transparent examination process.

The Office of the Controller of Examinations is responsible for:

- Preparation of examination schedule
- Student eligibility verification
- Admit card generation
- Secure question paper management
- Examination centre allocation
- Invigilation management
- Conduct of examinations
- Digital/Manual evaluation
- Moderation (where applicable)
- Result processing and publication

The weightage assigned to the End Term Examination shall be as prescribed in the respective Programme Regulations.

Assessment Component	Weightage
End Term Examination (TEE)	**70%**

9. Re-Examination / Supplementary Examination

The University provides opportunities for eligible students to improve academic performance through Re-Examinations/Supplementary Examinations in accordance with the approved Academic Regulations.

Students may become eligible for Re-Examination under conditions such as:

- Failure in one or more courses
- Absence due to approved reasons
- Improvement of performance (where permitted)
- Special examinations approved by the Competent Authority

The Office of the Controller of Examinations is responsible for:

- Notification of Re-Examination schedule

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- Online application and fee collection
- Student eligibility verification
- Course enrolment
- Admit card generation
- Conduct of examinations
- Evaluation and result declaration

The evaluation process, grading methodology, and result publication for Re-Examinations follow the same standards and quality assurance mechanisms applicable to regular examinations unless otherwise specified in the Academic Regulations.

10. Assessment of Projects, Dissertation and Research Work

The assessment of **Project Work, Dissertation, and Thesis** is designed to evaluate students' academic progress, research aptitude, analytical ability, originality, and overall achievement of the intended learning outcomes. The evaluation process is carried out in a structured and transparent manner in accordance with the applicable programme regulations.

A. Project Work Assessment

Project work shall be assessed through a series of periodic reviews conducted during the course of the project to monitor progress, evaluate implementation, and provide constructive feedback. The assessment pattern is as follows:

Project Review Component	Marks
First Review	5
Second Review	10
Third Review	15
Total	**30**

B. Dissertation / Thesis Assessment

The final evaluation of the Dissertation/Thesis shall be based on the quality of research, originality of work, analytical approach, presentation, and the overall contribution of the study. The assessment shall be carried out using the following components:

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Dissertation / Thesis Evaluation Component	Marks
Presentation and Viva-Voce	15
Content Originality	15
Study/Model Development and Analytical Validity	15
Findings and Conclusion	15
Future Scope and Recommendations	10
Total	**70**

The final award of marks shall be based on the cumulative performance in the project reviews and the Dissertation/Thesis evaluation. Assessment shall be conducted by the approved Internal and/or External Examiners in accordance with the University's examination and evaluation regulations, ensuring fairness, transparency, academic integrity, and consistency in the evaluation process.

11. Digital Examination Infrastructure

The University has established a robust and secure digital examination infrastructure to facilitate the seamless conduct of End Term Examinations for Online Learning (OL) programmes. The infrastructure is designed to support large-scale online proctored examinations while ensuring security, reliability, scalability, and compliance with the applicable University and UGC (ODL & OL) Regulations.

The digital examination infrastructure comprises:

- A secure and scalable Online Examination Platform capable of conducting large-scale assessments.
- Secure digital question paper management with controlled access and time-based release mechanisms.
- University Management System (UMS) integration for student registration, eligibility verification, admit card generation, examination scheduling, marks processing, and result publication.
- Dedicated Examination Control Room for real-time monitoring and coordination of online examination activities.
- Technical Helpdesk and Support Teams to provide real-time assistance to candidates and examination personnel before and during the examination.
- Secure data storage, encrypted transmission, examination logs, and automated backup mechanisms to ensure confidentiality, integrity, and traceability of examination records.
- Disaster recovery and business continuity mechanisms to minimize disruptions and ensure the successful completion of examinations in the event of technical contingencies.

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12. Key Features of the Online Learning (OL) Examination System

The Online Learning (OL) Examination System is designed to ensure a secure, transparent, technology-enabled, and student-centric assessment process while maintaining the highest standards of academic integrity and regulatory compliance. The key features of the system include:

- Transparent and standardized online examination procedures.
- Secure digital management of confidential question papers with controlled access and encrypted transmission.
- Secure candidate authentication and identity verification before the commencement of examinations.
- Structured allocation of Online Proctors and Technical Support Personnel to facilitate the smooth conduct of examinations.
- Real-time monitoring of online examination sessions through the approved online examination platform.
- Digital evaluation, marks processing, and result management through the University Management System (UMS).
- Multi-level verification of assessment records prior to the declaration of results.
- Timely publication of examination results and online access to Admit Cards, Grade Cards, and other examination-related services through the UMS.
- Comprehensive examination logs, and secure archival of examination records to ensure traceability and regulatory compliance.

Conclusion

The Office of the Controller of Examinations (CoE), in coordination with the Centre for Distance and Online Education (CDOE), is committed to maintaining the highest standards of academic integrity, transparency, and operational excellence in the conduct of examinations for Online Learning (OL) programmes. Through robust digital examination processes, secure online proctoring, technology-enabled assessment systems, and continuous monitoring, the University ensures that every stage of the examination process is conducted in a fair, secure, reliable, and student-centric manner. The integration of advanced digital technologies, comprehensive quality assurance mechanisms, and regulatory compliance enables the University to deliver credible, transparent, and outcome-based assessments while upholding the standards prescribed by the University Grants Commission (UGC) and supporting the University's commitment to academic excellence and continuous improvement.

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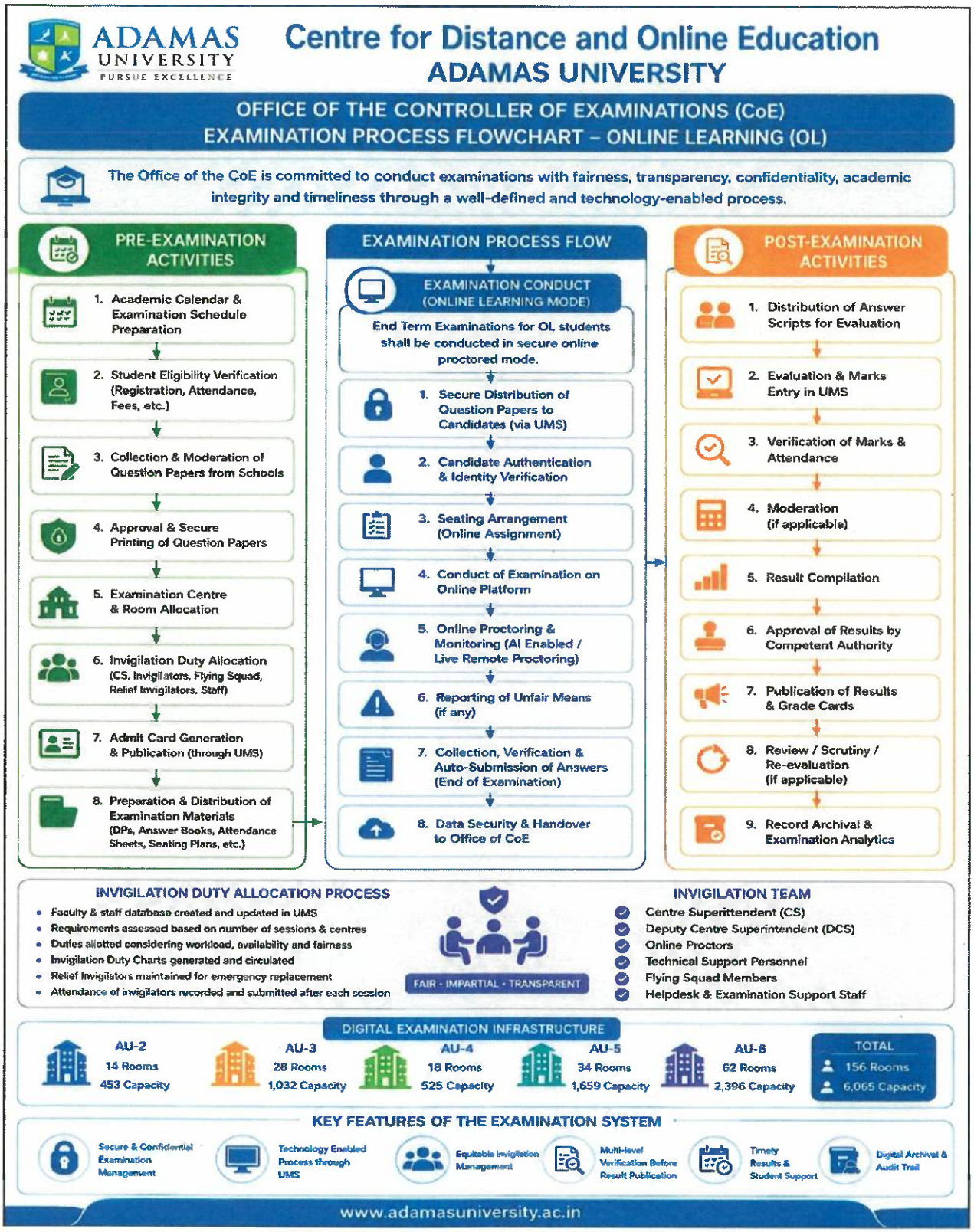
Examination Workflow



Controller of Examinations

Program	Subject Code	Semester	Subject Name	Topic Name	Link
MCA	OLMCA101T	1	Introduction to Programming	Introduction	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=5992
MCA	OLMCA101T	1	Introduction to Programming	Fundamentals of Procedural Programming	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=5993
MCA	OLMCA101T	1	Introduction to Programming	Variables and Data Types in C	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=5994
MCA	OLMCA101T	1	Introduction to Programming	Operators and Expressions	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=5995
MCA	OLMCA101T	1	Introduction to Programming	Control Flow: Conditional Execution and Loops	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=5996
MCA	OLMCA101T	1	Introduction to Programming	LAB	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=5997
MCA	OLMCA101T	1	Introduction to Programming	Arrays in C	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=5999
MCA	OLMCA101T	1	Introduction to Programming	Functions in C	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6000
MCA	OLMCA101T	1	Introduction to Programming	Pointers in C	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6001
MCA	OLMCA101T	1	Introduction to Programming	Structures in C	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6002
MCA	OLMCA101T	1	Introduction to Programming	Object-Oriented Programming Fundamentals	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6004
MCA	OLMCA101T	1	Introduction to Programming	Class Concepts in OOP	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6005
MCA	OLMCA101T	1	Introduction to Programming	Arrays and Objects in Classes	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6006
MCA	OLMCA101T	1	Introduction to Programming	Advanced Class Features	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6007
MCA	OLMCA101T	1	Introduction to Programming	Constructors in C++	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6009
MCA	OLMCA101T	1	Introduction to Programming	Constructor Overloading and Dynamic Initialization	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6010
MCA	OLMCA101T	1	Introduction to Programming	Destructors in C++	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6011
MCA	OLMCA101T	1	Introduction to Programming	Operator Overloading and Type Conversion	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6012

MCA	OLMCA101T	1	Introduction to Programming	Function Fundamentals in C++	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6014
MCA	OLMCA101T	1	Introduction to Programming	Reference Variables and Argument Passing	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6015
MCA	OLMCA101T	1	Introduction to Programming	Function Overloading and Math Library Functions	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6016
MCA	OLMCA101T	1	Introduction to Programming	Pointers in C++	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6017
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MCA	OLMCA101T	1	Introduction to Programming	Inheritance in C++	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6020
MCA	OLMCA101T	1	Introduction to Programming	Types of Inheritance and Containership	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6021
MCA	OLMCA101T	1	Introduction to Programming	Polymorphism and Abstract Classes	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6022
MCA	OLMCA101T	1	Introduction to Programming	C++ Stream Classes	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6024
MCA	OLMCA101T	1	Introduction to Programming	Unformatted and Formatted IO Operations	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6025
MCA	OLMCA101T	1	Introduction to Programming	Managing Output with Manipulators	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6026
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MCA	OLMCA101T	1	Introduction to Programming	Problem Solving in Banking Systems	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6034
MCA	OLMCA101T	1	Introduction to Programming	Library Management System Case Study	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6035
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MCA	OLMCA101T	1	Introduction to Programming	Hotel and Employee Management System Case Studies	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6037

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MCA	OLMCA102T	1	Computer Organization & Architecture	Concepts and Principles of Pipelining	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6617
MCA	OLMCA102T	1	Computer Organization & Architecture	Pipeline Hazards	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6618
MCA	OLMCA102T	1	Computer Organization & Architecture	Pipeline Implementation Issues	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6619
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MCA	OLMCA102T	1	Computer Organization & Architecture	Principles of Scalable Performance	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6623
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MCA	OLMCA103T	1	Operating System	Types and Services of Operating Systems	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=7896
MCA	OLMCA103T	1	Operating System	System Calls and OS Structure	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=7897
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MCA	OLMCA104	1	Business Communication	Net Etiquette	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=9256
MCA	OLMCA104	1	Business Communication	Report Writing Basics	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=9257
MCA	OLMCA104	1	Business Communication	Job Application Strategy	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=9258
MCA	OLMCA104	1	Business Communication	Curriculum Vitae (CV) and Resume	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=9259
MCA	OLMCA104	1	Business Communication	Group Discussion (GD)	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=9260

MCA	OLMCA104	1	Business Communication	Personal Interviews	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=9261
MCA	OLMCA104	1	Business Communication	Mock Simulations	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=9262
MCA	OLMCA105T	1	Numerical & Statistical Methods	Video - Numerical and Statistical Methods	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=13093
MCA	OLMCA105T	1	Numerical & Statistical Methods	Introduction	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6243
MCA	OLMCA105T	1	Numerical & Statistical Methods	Introduction to Statistics	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6244
MCA	OLMCA105T	1	Numerical & Statistical Methods	Data Presentation Techniques Part 1	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6245
MCA	OLMCA105T	1	Numerical & Statistical Methods	Data Presentation Techniques Part 2	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6246
MCA	OLMCA105T	1	Numerical & Statistical Methods	Measures of Central Tendency	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6247
MCA	OLMCA105T	1	Numerical & Statistical Methods	Other Measures of Central Tendency	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6248
MCA	OLMCA105T	1	Numerical & Statistical Methods	Measures of Variation and Shape	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6249
MCA	OLMCA105T	1	Numerical & Statistical Methods	Introduction to Correlation	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6251
MCA	OLMCA105T	1	Numerical & Statistical Methods	Rank Correlation Analysis	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6252
MCA	OLMCA105T	1	Numerical & Statistical Methods	Regression Analysis	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6253
MCA	OLMCA105T	1	Numerical & Statistical Methods	Curve Fitting Methods	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6254
MCA	OLMCA105T	1	Numerical & Statistical Methods	Fundamentals of Probability	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6256
MCA	OLMCA105T	1	Numerical & Statistical Methods	Bayes Rule and Applications	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6257
MCA	OLMCA105T	1	Numerical & Statistical Methods	Random Variables and Expectation	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6258
MCA	OLMCA105T	1	Numerical & Statistical Methods	Probability Distributions	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6259
MCA	OLMCA105T	1	Numerical & Statistical Methods	Hypothesis Testing Concepts	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6261
MCA	OLMCA105T	1	Numerical & Statistical Methods	Types of Statistical Tests	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6262

MCA	OLMCA105T	1	Numerical & Statistical Methods	Test on Single Mean	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6263
MCA	OLMCA105T	1	Numerical & Statistical Methods	Concepts of Errors in Numerical Methods	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6695
MCA	OLMCA105T	1	Numerical & Statistical Methods	Bisection and False Position Methods	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6696
MCA	OLMCA105T	1	Numerical & Statistical Methods	Secant and Newton-Raphson Methods	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6697
MCA	OLMCA105T	1	Numerical & Statistical Methods	Successive Approximation and Convergence	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6698
MCA	OLMCA105T	1	Numerical & Statistical Methods	Gauss Elimination Method	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6700
MCA	OLMCA105T	1	Numerical & Statistical Methods	Ill Conditioned Equations	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6701
MCA	OLMCA105T	1	Numerical & Statistical Methods	Iterative Methods for Linear Equations	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6702
MCA	OLMCA105T	1	Numerical & Statistical Methods	Comparison and Applications	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6703
MCA	OLMCA105T	1	Numerical & Statistical Methods	Errors and Power of Test	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=9533
MCA	OLMCA105T	1	Numerical & Statistical Methods	Finite Difference Analysis	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6705
MCA	OLMCA105T	1	Numerical & Statistical Methods	Interpolation Methods	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6706
MCA	OLMCA105T	1	Numerical & Statistical Methods	Lagrange and Divided Difference Methods	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6707
MCA	OLMCA105T	1	Numerical & Statistical Methods	Extrapolation and Inverse Interpolation	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6708
MCA	OLMCA105T	1	Numerical & Statistical Methods	Applications of Interpolation	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6709
MCA	OLMCA105T	1	Numerical & Statistical Methods	Numerical Differentiation	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6711
MCA	OLMCA105T	1	Numerical & Statistical Methods	Numerical Integration Techniques	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6712
MCA	OLMCA105T	1	Numerical & Statistical Methods	Comparison of Differentiation and Integration Methods	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6713
MCA	OLMCA105T	1	Numerical & Statistical Methods	Limitations and Practical Considerations	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6714
MCA	OLMCA105T	1	Numerical & Statistical Methods	Euler Method for ODEs	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=8839

MCA	OLMCA105T	1	Numerical & Statistical Methods	Initial Value Problems	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=8840
MCA	OLMCA105T	1	Numerical & Statistical Methods	Limitations and Applications	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=8841
MCA	OLMCA105T	1	Numerical & Statistical Methods	Direct Methods for Linear Equations	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=8843
MCA	OLMCA105T	1	Numerical & Statistical Methods	Iterative Methods for Linear Equations	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=8844
MCA	OLMCA105T	1	Numerical & Statistical Methods	Comparison of Direct and Iterative Methods	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=8845
MCA	OLMCA105T	1	Numerical & Statistical Methods	Applications of Simultaneous Equation Solutions	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=8846
MCA	OLMCA105T	1	Numerical & Statistical Methods	Case Study in Numerical Differentiation	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=8848
MCA	OLMCA105T	1	Numerical & Statistical Methods	Case Study in Numerical Integration	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=8849
MCA	OLMCA105T	1	Numerical & Statistical Methods	Application Examples	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=8850
MCA	OLMCA105T	1	Numerical & Statistical Methods	Comparative Study	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=8851
MCA	OLMCA105T	1	Numerical & Statistical Methods	Summary	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=8852
MCA	OLMCA105T	1	Numerical & Statistical Methods	Runge-Kutta Method	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=11859
MCA	OLMCA105P	1	Numerical & Statistical Methods Lab	Practical - Part A	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=9464
MCA	OLMCA105P	1	Numerical & Statistical Methods Lab	Practical - Part B	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=9465
MCA	OLMCA105P	1	Numerical & Statistical Methods Lab	Practical - Part C	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=9466
MCA	OLMCA105P	1	Numerical & Statistical Methods Lab	Practical - Part D	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=9467
MCA	OLMCA105P	1	Numerical & Statistical Methods Lab	Practical - Part E	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=9468
MCA	OLMCA105P	1	Numerical & Statistical Methods Lab	Practical - Part F	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=12095
MCA	OLMCA105P	1	Numerical & Statistical Methods Lab	Practical - Part G	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=12096
MCA	OLMCA105P	1	Numerical & Statistical Methods Lab	Practical - Part H	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=12097

MCA	OLMCA105P	1	Numerical & Statistical Methods Lab	Practical - Part I	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=12098
MCA	OLMCA105P	1	Numerical & Statistical Methods Lab	Practical - Part J	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=12099
MCA	OLMCA105P	1	Numerical & Statistical Methods Lab	Practical - Part K	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=12100
MCA	OLMCA105P	1	Numerical & Statistical Methods Lab	Practical - Part L	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=12101
MCA	OLMCA105P	1	Numerical & Statistical Methods Lab	Practical - Part M	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=12102
MCA	OLMCA105P	1	Numerical & Statistical Methods Lab	Practical - Part N	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=12103
MCA	OLMCA106T	1	Software Engineering	Introduction to Software Engineering - Basic Concepts -Part 1	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=13309
MCA	OLMCA106T	1	Software Engineering	Introduction to Software Engineering - Basic Concepts -Part 2	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=13310
MCA	OLMCA106T	1	Software Engineering	Introduction to Software Engineering - Basic Concepts -Part 3	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=13311
MCA	OLMCA106T	1	Software Engineering	Introduction to Software Engineering - Basic Concepts -Part 4	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=13312
MCA	OLMCA106T	1	Software Engineering	Introduction to Software Engineering - Basic Concepts -Part 5	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=13313
MCA	OLMCA106T	1	Software Engineering	Introduction to Software Engineering - Basic Concepts -Part 6	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=13314
MCA	OLMCA106T	1	Software Engineering	Introduction to Software Engineering - Basic Concepts -Part 7	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=13315
MCA	OLMCA106T	1	Software Engineering	Introduction to Software Engineering - Basic Concepts -Part 8	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=13316
MCA	OLMCA106T	1	Software Engineering	Introduction to Software Engineering - Basic Concepts -Part 9	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=13317
MCA	OLMCA106T	1	Software Engineering	Software Development Life Cycle (SDLC) -Part 1	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=13319
MCA	OLMCA106T	1	Software Engineering	Software Development Life Cycle (SDLC) -Part 2	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=13388
MCA	OLMCA106T	1	Software Engineering	Software Development Life Cycle (SDLC) -Part 3	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=13320
MCA	OLMCA106T	1	Software Engineering	Software Development Life Cycle (SDLC) -Part 4	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=13321
MCA	OLMCA106T	1	Software Engineering	Software Development Life Cycle (SDLC) -Part 5	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=13322

MCA	OLMCA106T	1	Software Engineering	Software Development Life Cycle (SDLC) -Part 6	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=13323
MCA	OLMCA106T	1	Software Engineering	Software Development Life Cycle (SDLC) -Part 7	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=13324
MCA	OLMCA106T	1	Software Engineering	Software Development Life Cycle (SDLC) -Part 8	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=13324
MCA	OLMCA106T	1	Software Engineering	Software Development Life Cycle (SDLC) -Part 9	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=13326
MCA	OLMCA106T	1	Software Engineering	Software Development Life Cycle (SDLC) -Part 10	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=13327
MCA	OLMCA106T	1	Software Engineering	Applications, Practices, and Myths of Software Engineering -Part 1	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=13329
MCA	OLMCA106T	1	Software Engineering	Applications, Practices, and Myths of Software Engineering -Part 2	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=13330
MCA	OLMCA106T	1	Software Engineering	Applications, Practices, and Myths of Software Engineering -Part 3	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=13331
MCA	OLMCA106T	1	Software Engineering	Applications, Practices, and Myths of Software Engineering -Part 4	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=13332
MCA	OLMCA106T	1	Software Engineering	Applications, Practices, and Myths of Software Engineering -Part 5	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=13333
MCA	OLMCA106T	1	Software Engineering	Applications, Practices, and Myths of Software Engineering -Part 6	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=13334
MCA	OLMCA106T	1	Software Engineering	Applications, Practices, and Myths of Software Engineering -Part 7	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=13335
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MCA	OLMCA106T	1	Software Engineering	Generic Process Model and Assessment -Part 1	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=13339
MCA	OLMCA106T	1	Software Engineering	Generic Process Model and Assessment -Part 2	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=13340
MCA	OLMCA106T	1	Software Engineering	The Waterfall Model -Part 1	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=13342
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MCA	OLMCA106T	1	Software Engineering	Incremental Process Models -Part 1	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=13345
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MCA	OLMCA106T	1	Software Engineering	Evolutionary Software Process Models -Part 1	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=13348
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MCA	OLMCA106T	1	Software Engineering	Concurrent and Specialized Process Models -Part 1	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=13351
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MCA	OLMCA106T	1	Software Engineering	Metrics for Process and Projects -Part 1	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=13354
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MCA	OLMCA106T	1	Software Engineering	Software Measurement Metrics -Part 1	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=13357
MCA	OLMCA106T	1	Software Engineering	Software Measurement Metrics -Part 2	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=13358
MCA	OLMCA106T	1	Software Engineering	Risk Analysis and Management - Introduction and Planning -Part 1	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=13360
MCA	OLMCA106T	1	Software Engineering	Risk Analysis and Management - Introduction and Planning -Part 2	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=13361
MCA	OLMCA106T	1	Software Engineering	Risk Strategies and Identification	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=13363
MCA	OLMCA106T	1	Software Engineering	Risk Projection and Mitigation	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=13365
MCA	OLMCA106T	1	Software Engineering	Introduction to UML and Structural Modeling Basics	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=13367
MCA	OLMCA106T	1	Software Engineering	Advanced Structural Modeling and Behavioral Modeling	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=13368
MCA	OLMCA106T	1	Software Engineering	Practical 1	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=13369
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MCA	OLMCA106T	1	Software Engineering	Practical 14	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=13382
MCA	OLMCA201	2	Switching Circuits and Logic Design	Introduction	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=10644
MCA	OLMCA201	2	Switching Circuits and Logic Design	Overview of Logic Families	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=10645
MCA	OLMCA201	2	Switching Circuits and Logic Design	CMOS and Dynamic CMOS Logic	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=10646
MCA	OLMCA201	2	Switching Circuits and Logic Design	Pass Transistor and Other Logic Gates	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=10647
MCA	OLMCA201	2	Switching Circuits and Logic Design	Performance Parameters of Logic Gates	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=10648
MCA	OLMCA201	2	Switching Circuits and Logic Design	Basics of Switching Algebra	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=10650
MCA	OLMCA201	2	Switching Circuits and Logic Design	Function Minimization Techniques	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=10651
MCA	OLMCA201	2	Switching Circuits and Logic Design	Karnaugh Map and Quine-McCluskey Method	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=10652
MCA	OLMCA201	2	Switching Circuits and Logic Design	Advanced Function Representation and Synthesis	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=10653
MCA	OLMCA201	2	Switching Circuits and Logic Design	Boolean Function Realization	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=10655
MCA	OLMCA201	2	Switching Circuits and Logic Design	Programmable Logic Devices	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=10656
MCA	OLMCA201	2	Switching Circuits and Logic Design	Logic Design Using Programmable Devices	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=10657

MCA	OLMCA201	2	Switching Circuits and Logic Design	Case Studies and Fault Diagnosis	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=10658
MCA	OLMCA201	2	Switching Circuits and Logic Design	Clocking and Storage Elements	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=10660
MCA	OLMCA201	2	Switching Circuits and Logic Design	Counters and Shift Registers	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=10661
MCA	OLMCA201	2	Switching Circuits and Logic Design	Finite-State Machine Models	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=10662
MCA	OLMCA201	2	Switching Circuits and Logic Design	Sequential Circuit Design Applications	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=10663
MCA	OLMCA201	2	Switching Circuits and Logic Design	Synchronous Sequential Circuit Synthesis	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=11082
MCA	OLMCA201	2	Switching Circuits and Logic Design	Mealy and Moore Machine Conversion	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=11083
MCA	OLMCA201	2	Switching Circuits and Logic Design	Minimization and State Assignment	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=11084
MCA	OLMCA201	2	Switching Circuits and Logic Design	Incompletely Specified and Asynchronous Circuits	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=11085
MCA	OLMCA201	2	Switching Circuits and Logic Design	ASM Chart Fundamentals	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=11087
MCA	OLMCA201	2	Switching Circuits and Logic Design	Synthesis of Output and Next State Functions	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=11088
MCA	OLMCA201	2	Switching Circuits and Logic Design	Data Path and Control Path Partitioning	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=11089
MCA	OLMCA201	2	Switching Circuits and Logic Design	ASM Chart Design Applications	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=11090
MCA	OLMCA201	2	Switching Circuits and Logic Design	Logic Design Using ROMs	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=11397
MCA	OLMCA201	2	Switching Circuits and Logic Design	Logic Design Using PLAs	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=11398
MCA	OLMCA201	2	Switching Circuits and Logic Design	Logic Design Using FPGAs	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=11399
MCA	OLMCA201	2	Switching Circuits and Logic Design	Case Studies in Programmable Logic Design	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=11400
MCA	OLMCA201	2	Switching Circuits and Logic Design	Fundamentals of Fault Diagnosis	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=11402
MCA	OLMCA201	2	Switching Circuits and Logic Design	Fault Detection Methods	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=11403
MCA	OLMCA201	2	Switching Circuits and Logic Design	Fault Diagnosis Techniques	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=11404

MCA	OLMCA201	2	Switching Circuits and Logic Design	Applications and Case Studies	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=11405
MCA	OLMCA201	2	Switching Circuits and Logic Design	Sequential Circuit Minimization	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=11407
MCA	OLMCA201	2	Switching Circuits and Logic Design	State Assignment Strategies	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=11408
MCA	OLMCA201	2	Switching Circuits and Logic Design	Incompletely Specified Machine Minimization	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=11409
MCA	OLMCA201	2	Switching Circuits and Logic Design	Applications and Case Studies	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=11410
MCA	OLMCA201	2	Switching Circuits and Logic Design	Fundamentals of Asynchronous Circuits	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=11492
MCA	OLMCA201	2	Switching Circuits and Logic Design	Synthesis Process for Asynchronous Circuits	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=11493
MCA	OLMCA201	2	Switching Circuits and Logic Design	Hazards and Races in Asynchronous Circuits	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=11494
MCA	OLMCA201	2	Switching Circuits and Logic Design	Applications and Case Studies	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=11495
MCA	OLMCA201	2	Switching Circuits and Logic Design	Data Path Partitioning	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=11497
MCA	OLMCA201	2	Switching Circuits and Logic Design	Control Path Partitioning	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=11498
MCA	OLMCA201	2	Switching Circuits and Logic Design	Integration of Data Path and Control Path	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=11499
MCA	OLMCA201	2	Switching Circuits and Logic Design	Applications and Case Studies	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=11500
MCA	OLMCA201	2	Switching Circuits and Logic Design	Summary	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=11501
MCA	OLMCA201	2	Switching Circuits and Logic Design	Case Study 1	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=12142
MCA	OLMCA201	2	Switching Circuits and Logic Design	Case Study 2	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=12143
MCA	OLMCA201	2	Switching Circuits and Logic Design	Case Study 3	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=12144
MCA	OLMCA201	2	Switching Circuits and Logic Design	Case Study 4	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=12145
MCA	OLMCA201	2	Switching Circuits and Logic Design	Case Study 5	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=12146
MCA	OLMCA202T	2	Object Oriented Programming with Java	Object Oriented Programming Concepts	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6718

MCA	OLMCA202T	2	Object Oriented Programming with Java	Java Language Basics	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6719
MCA	OLMCA202T	2	Object Oriented Programming with Java	Operators and Expressions	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6720
MCA	OLMCA202T	2	Object Oriented Programming with Java	Control Flow and Arrays	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6721
MCA	OLMCA202T	2	Object Oriented Programming with Java	Methods, Constructors, and Memory Management	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6722
MCA	OLMCA202T	2	Object Oriented Programming with Java	String Handling in Java	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6723
MCA	OLMCA202T	2	Object Oriented Programming with Java	Inheritance in Java	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=7008
MCA	OLMCA202T	2	Object Oriented Programming with Java	Advanced Inheritance Features	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=7009
MCA	OLMCA202T	2	Object Oriented Programming with Java	Abstraction and Interfaces	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=7010
MCA	OLMCA202T	2	Object Oriented Programming with Java	Inner Classes and Packages	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=7011
MCA	OLMCA202T	2	Object Oriented Programming with Java	Exception Handling Fundamentals	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=7013
MCA	OLMCA202T	2	Object Oriented Programming with Java	Exception Specification and Custom Exceptions	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=7014
MCA	OLMCA202T	2	Object Oriented Programming with Java	Multithreading Concepts	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=7015
MCA	OLMCA202T	2	Object Oriented Programming with Java	Synchronization and Communication	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=7016
MCA	OLMCA202T	2	Object Oriented Programming with Java	Introduction	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=9688
MCA	OLMCA202T	2	Object Oriented Programming with Java	Java Collections Framework	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=7973
MCA	OLMCA202T	2	Object Oriented Programming with Java	List and Stack Implementations	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=7974
MCA	OLMCA202T	2	Object Oriented Programming with Java	Map and Iterator Utilities	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=7975
MCA	OLMCA202T	2	Object Oriented Programming with Java	Utility Classes	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=7976
MCA	OLMCA202T	2	Object Oriented Programming with Java	File Concepts	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=7978
MCA	OLMCA202T	2	Object Oriented Programming with Java	Streams in Java	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=7979

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MCA	OLMCA202T	2	Object Oriented Programming with Java	Random Access and Advanced File Operations	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=7981
MCA	OLMCA202T	2	Object Oriented Programming with Java	Introduction to JDBC and ODBC	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=7983
MCA	OLMCA202T	2	Object Oriented Programming with Java	Advanced JDBC Operations	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=7984
MCA	OLMCA202T	2	Object Oriented Programming with Java	JDBC Driver Types, 6.3 Database Connection Establishment	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=9526
MCA	OLMCA202T	2	Object Oriented Programming with Java	AWT Fundamentals	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=9528
MCA	OLMCA202T	2	Object Oriented Programming with Java	Swing Introduction and Hierarchy	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=9529
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MCA	OLMCA202T	2	Object Oriented Programming with Java	Applications of Generics	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=9693
MCA	OLMCA202T	2	Object Oriented Programming with Java	Advanced Argument Handling	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=9694
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MCA	OLMCA202P	2	Object Oriented Programming with Java Lab	Lab A	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=9696
MCA	OLMCA202P	2	Object Oriented Programming with Java Lab	Lab B	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=9697
MCA	OLMCA202P	2	Object Oriented Programming with Java Lab	Lab C	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=9698
MCA	OLMCA202P	2	Object Oriented Programming with Java Lab	Lab D	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=11810
MCA	OLMCA202P	2	Object Oriented Programming with Java Lab	Lab E	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=11811
MCA	OLMCA202P	2	Object Oriented Programming with Java Lab	Lab F	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=11812
MCA	OLMCA202P	2	Object Oriented Programming with Java Lab	Lab G	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=11813
MCA	OLMCA202P	2	Object Oriented Programming with Java Lab	Lab G	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=11814
MCA	OLMCA202P	2	Object Oriented Programming with Java Lab	Lab H	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=11815
MCA	OLMCA202P	2	Object Oriented Programming with Java Lab	Lab I	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=11816
MCA	OLMCA202P	2	Object Oriented Programming with Java Lab	Lab J	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=11817
MCA	OLMCA202P	2	Object Oriented Programming with Java Lab	Lab K	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=11818
MCA	OLMCA202P	2	Object Oriented Programming with Java Lab	Lab L	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=11819
MCA	OLMCA202P	2	Object Oriented Programming with Java Lab	Lab M	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=11820

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MCA	OLMCA203T	2	Data Structures	Pointer Concepts and Dynamic Memory Allo	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=8881
MCA	OLMCA203T	2	Data Structures	Structures and Recursion	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=8882
MCA	OLMCA203T	2	Data Structures	Abstract Data Type Stack	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=8884
MCA	OLMCA203T	2	Data Structures	Applications of Stacks	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=8885
MCA	OLMCA203T	2	Data Structures	Single Linked List	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=8887
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MCA	OLMCA203T	2	Data Structures	Algorithm Analysis and Asymptotic Notati	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=9700
MCA	OLMCA203T	2	Data Structures	Arrays and Searching Techniques	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=9701
MCA	OLMCA203T	2	Data Structures	Algorithm Complexity Analysis	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=9702
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MCA	OLMCA203T	2	Data Structures	Priority Queue and Operations	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=9704
MCA	OLMCA203T	2	Data Structures	Circular Linked List	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=9705
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MCA	OLMCA203T	2	Data Structures	Linked Representation and Applications	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=12271
MCA	OLMCA203T	2	Data Structures	Basic Tree Terminologies	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=8890
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MCA	OLMCA203T	2	Data Structures	B Tree and B+ Tree Definitions	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=9549
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MCA	OLMCA203T	2	Data Structures	Elementary Sorting Methods	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=9553
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MCA	OLMCA203P	2	Data Structures Lab	Experiment_44	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=12112
MCA	OLMCA204T	2	Database Management System	Introduction	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=8096
MCA	OLMCA204T	2	Database Management System	Data Abstraction and Independence	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=8098
MCA	OLMCA204T	2	Database Management System	Data Definition and Manipulation Languag	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=8099
MCA	OLMCA204T	2	Database Management System	Data Models and Integrity Constraints	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=8100
MCA	OLMCA204T	2	Database Management System	Advanced ER Concepts	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=8101
MCA	OLMCA204T	2	Database Management System	Fundamentals of Relational Algebra	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=8103
MCA	OLMCA204T	2	Database Management System	Advanced Relational Algebra Operations	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=8104
MCA	OLMCA204T	2	Database Management System	Relational Calculus	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=8105
MCA	OLMCA204T	2	Database Management System	SQL and Database Systems	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=8106
MCA	OLMCA204T	2	Database Management System	Integrity Constraints	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=8108

MCA	OLMCA204T	2	Database Management System	Functional Dependencies	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=8109
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MCA	OLMCA204T	2	Database Management System	Anomalies and Assertions	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=8111
MCA	OLMCA204T	2	Database Management System	Relational Algebra Expression Evaluation	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=8113
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MCA	OLMCA204T	2	Database Management System	Join Strategies	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=8115
MCA	OLMCA204T	2	Database Management System	Query Optimization Algorithms	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=8116
MCA	OLMCA204T	2	Database Management System	File System and Disk Organization	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=8118
MCA	OLMCA204T	2	Database Management System	Physical Storage Management	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=8119
MCA	OLMCA204T	2	Database Management System	Indexing Structures	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=8936
MCA	OLMCA204T	2	Database Management System	Hashing Techniques	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=8937
MCA	OLMCA204T	2	Database Management System	Transaction Concepts	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=8121
MCA	OLMCA204T	2	Database Management System	Transaction Failures and Recovery	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=8122
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MCA	OLMCA204T	2	Database Management System	Concurrency Control Mechanisms	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=8939
MCA	OLMCA204T	2	Database Management System	Role-Based Access Control (RBAC)	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=8940
MCA	OLMCA204T	2	Database Management System	Database Attacks and Intrusion Detection	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=8941
MCA	OLMCA204T	2	Database Management System	ER-Model to Relational Conversion	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=8127

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MCA	OLMCA204T	2	Database Management System	Comparison of DBMS Types	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=8945
MCA	OLMCA204T	2	Database Management System	SQL3 Features	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=8946
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MCA	OLMCA204T	2	Database Management System	Data Mining	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=9570
MCA	OLMCA204T	2	Database Management System	Integration of Advanced Topics	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=9571
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MCA	OLMCA204P	2	Database Management System Lab	Lab D	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=11658

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MCA	OLMCA204P	2	Database Management System Lab	Lab G	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=11660
MCA	OLMCA204P	2	Database Management System Lab	Lab H	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=11661
MCA	OLMCA204P	2	Database Management System Lab	Lab I	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=12063
MCA	OLMCA204P	2	Database Management System Lab	Lab J	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=12064
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MCA	OLMCA204P	2	Database Management System Lab	Lab L	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=12066
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MCA	OLMCA205	2	Discrete Mathematics	Operations and Laws of Sets	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=9580
MCA	OLMCA205	2	Discrete Mathematics	Cartesian Products and Relations	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=9581
MCA	OLMCA205	2	Discrete Mathematics	Types of Relations	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=9582
MCA	OLMCA205	2	Discrete Mathematics	Functions and Their Properties	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=9583
MCA	OLMCA205	2	Discrete Mathematics	Propositional Logic: Syntax and Semantic	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=9585
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MCA	OLMCA205	2	Discrete Mathematics	Mathematical Induction and Recursion	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=9588
MCA	OLMCA205	2	Discrete Mathematics	Size and Classification of Sets	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=10118
MCA	OLMCA205	2	Discrete Mathematics	Advanced Set Theorems	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=10119
MCA	OLMCA205	2	Discrete Mathematics	Fundamentals of Number Theory	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=10120
MCA	OLMCA205	2	Discrete Mathematics	Greatest Common Divisor and Algorithms	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=10121

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MCA	OLMCA205	2	Discrete Mathematics	Generating Functions	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=10125
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MCA	OLMCA205	2	Discrete Mathematics	Binary Operations and Algebraic Structur	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=10128
MCA	OLMCA205	2	Discrete Mathematics	Groups and Their Properties	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=10129
MCA	OLMCA205	2	Discrete Mathematics	Congruence and Quotient Structures	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=10130
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MCA	OLMCA205	2	Discrete Mathematics	Subgraphs and Isomorphism	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=10689
MCA	OLMCA205	2	Discrete Mathematics	Properties and Applications of Graphs	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=10690
MCA	OLMCA205	2	Discrete Mathematics	Eulerian Walks	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=10692
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MCA	OLMCA205	2	Discrete Mathematics	Introduction to Trees	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=11195
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MBA	OLMBAGM101	1	Organizational Behaviour	Integration of Technology and Data in OB	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6775
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MBA	OLMBAGSE102	1	Entrepreneurship Development	Early Career Dynamics	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6524
MBA	OLMBAGSE102	1	Entrepreneurship Development	The Entrepreneur’s Role	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6525
MBA	OLMBAGSE102	1	Entrepreneurship Development	Entrepreneurial Personality	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6526
MBA	OLMBAGSE102	1	Entrepreneurship Development	Typology of Entrepreneurs	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6527
MBA	OLMBAGSE102	1	Entrepreneurship Development	Competency Framework	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6528
MBA	OLMBAGSE102	1	Entrepreneurship Development	Defining Success and Survival	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6531
MBA	OLMBAGSE102	1	Entrepreneurship Development	Entrepreneurial Management Styles	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6532
MBA	OLMBAGSE102	1	Entrepreneurship Development	Entrepreneurial Growth	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6533

MBA	OLMBAGSE102	1	Entrepreneurship Development	Management Transitions	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6534
MBA	OLMBAGSE102	1	Entrepreneurship Development	Sustainable Management	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6535
MBA	OLMBAGSE102	1	Entrepreneurship Development	Institutional Support Framework	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6538
MBA	OLMBAGSE102	1	Entrepreneurship Development	Financial and Developmental Agencies	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6539
MBA	OLMBAGSE102	1	Entrepreneurship Development	Entrepreneurship Development	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6540
MBA	OLMBAGSE102	1	Entrepreneurship Development	Rural and Small Scale Entrepreneurs	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6541
MBA	OLMBAGSE102	1	Entrepreneurship Development	Export Entrepreneurs	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6542
MBA	OLMBAGSE102	1	Entrepreneurship Development	Fundamentals of Business Ideas	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6545
MBA	OLMBAGSE102	1	Entrepreneurship Development	Idea Generation Techniques	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6546
MBA	OLMBAGSE102	1	Entrepreneurship Development	Identification of Opportunities	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6547
MBA	OLMBAGSE102	1	Entrepreneurship Development	Opportunity Evaluation	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6548
MBA	OLMBAGSE102	1	Entrepreneurship Development	From Idea to Concept	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6549
MBA	OLMBAGSE102	1	Entrepreneurship Development	Introduction to Feasibility	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6552
MBA	OLMBAGSE102	1	Entrepreneurship Development	Marketing and Financial Feasibility	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6553
MBA	OLMBAGSE102	1	Entrepreneurship Development	Technical and Location Feasibility	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6554
MBA	OLMBAGSE102	1	Entrepreneurship Development	Managerial and Legal Feasibility	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6555
MBA	OLMBAGSE102	1	Entrepreneurship Development	Environmental and Economic Feasibility	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6556
MBA	OLMBAGSE102	1	Entrepreneurship Development	Business Plan Fundamentals	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6559
MBA	OLMBAGSE102	1	Entrepreneurship Development	Content of a Business Plan	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6560
MBA	OLMBAGSE102	1	Entrepreneurship Development	Project Report Preparation	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6561

MBA	OLMBAGSE102	1	Entrepreneurship Development	Project Appraisal Methods	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6562
MBA	OLMBAGSE102	1	Entrepreneurship Development	Non-Financial Appraisal	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6563
MBA	OLMBAGSE102	1	Entrepreneurship Development	Summary	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6565
MBA	OLMBAGSE102	1	Entrepreneurship Development	Case Study 1	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6515
MBA	OLMBAGSE102	1	Entrepreneurship Development	Case Study 2	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6522
MBA	OLMBAGSE102	1	Entrepreneurship Development	Case Study 3	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6529
MBA	OLMBAGSE102	1	Entrepreneurship Development	Case Study 4	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6536
MBA	OLMBAGSE102	1	Entrepreneurship Development	Case Study 5	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6543
MBA	OLMBAGSE102	1	Entrepreneurship Development	Case Study 6	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6550
MBA	OLMBAGSE102	1	Entrepreneurship Development	Case Study 7	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6557
MBA	OLMBAGSE102	1	Entrepreneurship Development	Case Study 8	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=6564
MBA	OLMBAGM205	2	Research Methodology	Introduction	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=11770
MBA	OLMBAGM205	2	Research Methodology	Introduction to Research Concept	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=12529
MBA	OLMBAGM205	2	Research Methodology	Scope and Significance	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=11771
MBA	OLMBAGM205	2	Research Methodology	Types of Research	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=11772
MBA	OLMBAGM205	2	Research Methodology	Ethics in Research	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=11773
MBA	OLMBAGM205	2	Research Methodology	Overview of Research Process	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=11795
MBA	OLMBAGM205	2	Research Methodology	Execution Phase	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=11796
MBA	OLMBAGM205	2	Research Methodology	Criteria of Good Research	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=11797
MBA	OLMBAGM205	2	Research Methodology	Barriers to Research	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=11798

MBA	OLMBAGM205	2	Research Methodology	Introduction to Philosophy	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=11800
MBA	OLMBAGM205	2	Research Methodology	Ontology	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=11801
MBA	OLMBAGM205	2	Research Methodology	Epistemology	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=11802&forceview=1
MBA	OLMBAGM205	2	Research Methodology	Research Paradigms	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=11803&forceview=1
MBA	OLMBAGM205	2	Research Methodology	Identification of Problem	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=11805
MBA	OLMBAGM205	2	Research Methodology	Research Gap	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=11806&forceview=1
MBA	OLMBAGM205	2	Research Methodology	Research Questions	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=11830&forceview=1
MBA	OLMBAGM205	2	Research Methodology	Research Objectives	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=11831&forceview=1
MBA	OLMBAGM205	2	Research Methodology	Introduction to Design	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=11833
MBA	OLMBAGM205	2	Research Methodology	Exploratory Design	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=11834&forceview=1
MBA	OLMBAGM205	2	Research Methodology	Descriptive Design	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=11835&forceview=1
MBA	OLMBAGM205	2	Research Methodology	Causal Research Design	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=13017&forceview=1
MBA	OLMBAGM205	2	Research Methodology	Introduction to Review	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=12370
MBA	OLMBAGM205	2	Research Methodology	Sources of Literature	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=12371
MBA	OLMBAGM205	2	Research Methodology	Conducting the Review	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=12372&forceview=1
MBA	OLMBAGM205	2	Research Methodology	Synthesis and Citation	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=12373&forceview=1
MBA	OLMBAGM205	2	Research Methodology	Understanding Frameworks	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=12375&forceview=1
MBA	OLMBAGM205	2	Research Methodology	Theoretical Framework	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=12376&forceview=1
MBA	OLMBAGM205	2	Research Methodology	Conceptual Framework	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=12377&forceview=1
MBA	OLMBAGM205	2	Research Methodology	Linking Frameworks to Design	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=12378&forceview=1

MBA	OLMBAGM205	2	Research Methodology	Introduction to Data Sources	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=12380&forceview=1
MBA	OLMBAGM205	2	Research Methodology	Observation Methods	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=12381&forceview=1
MBA	OLMBAGM205	2	Research Methodology	Interview Methods	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=12382
MBA	OLMBAGM205	2	Research Methodology	Survey and Questionnaires	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=12383&forceview=1
MBA	OLMBAGM205	2	Research Methodology	Quantitative Methodology	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=12385
MBA	OLMBAGM205	2	Research Methodology	Qualitative Methodology	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=12386
MBA	OLMBAGM205	2	Research Methodology	Mixed Methods	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=12387&forceview=1
MBA	OLMBAGM205	2	Research Methodology	Choosing Methodology	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=12388&forceview=1
MBA	OLMBAGM205	2	Research Methodology	Fundamentals of Sampling	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=12390
MBA	OLMBAGM205	2	Research Methodology	Probability Sampling	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=12391
MBA	OLMBAGM205	2	Research Methodology	Non-Probability Sampling	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=12392
MBA	OLMBAGM205	2	Research Methodology	Sampling Errors	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=12393
MBA	OLMBAGM205	2	Research Methodology	Importance of Sample Size	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=12395
MBA	OLMBAGM205	2	Research Methodology	Calculation Methods	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=12396
MBA	OLMBAGM205	2	Research Methodology	Power Analysis	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=12397
MBA	OLMBAGM205	2	Research Methodology	Practical Considerations	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=12398&forceview=1
MBA	OLMBAGM205	2	Research Methodology	Introduction to Hypotheses	http://lms.adamasuniversitycdoe.com/mod/url/view.php?id=12400
MBA	OLMBAGM205	2	Research Methodology	Logic of Testing	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=12401
MBA	OLMBAGM205	2	Research Methodology	Errors in Testing	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=12402&forceview=1
MBA	OLMBAGM205	2	Research Methodology	Parametric vs Non-Parametric	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=12403

MBA	OLMBAGM205	2	Research Methodology	Means Comparison	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=12405&forceview=1
MBA	OLMBAGM205	2	Research Methodology	Analysis of Variance	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=12526&forceview=1
MBA	OLMBAGM205	2	Research Methodology	Non-Parametric Tests	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=12527
MBA	OLMBAGM205	2	Research Methodology	Correlation and Regression	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=12528
MBA	OLMBAGM205	2	Research Methodology	Introduction to SPSS	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=12407
MBA	OLMBAGM205	2	Research Methodology	Introduction to NVIVO	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=12408
MBA	OLMBAGM205	2	Research Methodology	Tabular Representation	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=12409
MBA	OLMBAGM205	2	Research Methodology	Graphical Representation	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=12410
MBA	OLMBAGM205	2	Research Methodology	Summary 01	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=12411
MBA	OLMBAGM205	2	Research Methodology	Summary 02	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=12412&forceview=1
MBA	OLMBAGM205	2	Research Methodology	Summary 03	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=12413&forceview=1
MBA	OLMBAGM205	2	Research Methodology	Casestudy 01	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=13018
MBA	OLMBAGM205	2	Research Methodology	Casestudy 02	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=13019&forceview=1
MBA	OLMBAGM205	2	Research Methodology	Casestudy 03	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=13020&forceview=1
MBA	OLMBAGM205	2	Research Methodology	Casestudy 04	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=13021&forceview=1
MBA	OLMBAGM205	2	Research Methodology	Casestudy 05	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=13022&forceview=1
MBA	OLMBAGM205	2	Research Methodology	Casestudy 06	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=13023&forceview=1
MBA	OLMBAGM205	2	Research Methodology	Casestudy 07	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=13024&forceview=1
MBA	OLMBAGM205	2	Research Methodology	Casestudy 08	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=13025&forceview=1
MBA	OLMBAGM205	2	Research Methodology	Casestudy 09	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=13384

MBA	OLMBAGM205	2	Research Methodology	Casestudy 10	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=13385&forceview=1
MBA	OLMBAGM205	2	Research Methodology	Casestudy 11	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=13386&forceview=1
MBA	OLMBAGM205	2	Research Methodology	Casestudy 12	https://lms.adamasuniversitycdoe.com/mod/url/view.php?id=13387&forceview=1

Sr. No	Program	Subject Code	Semester	Subject Name	LMS Link
1	MCA	OLMCA101T	1	Introduction to Programming	https://lms.adamasuniversitycdoe.com/mod/page/view.php?id=5674
2	MCA	OLMCA101P	1	Introduction to Programming Lab	https://lms.adamasuniversitycdoe.com/mod/page/view.php?id=5682
3	MCA	OLMCA102T	1	Computer Organization & Architecture	https://lms.adamasuniversitycdoe.com/mod/page/view.php?id=9817
4	MCA	OLMCA102P	1	Computer Organization & Architecture Lab	https://lms.adamasuniversitycdoe.com/mod/page/view.php?id=9818
5	MCA	OLMCA103T	1	Operating System	https://lms.adamasuniversitycdoe.com/mod/page/view.php?id=11059
6	MCA	OLMCA103P	1	Operating System Lab	https://lms.adamasuniversitycdoe.com/mod/page/view.php?id=5680
7	MCA	OLMCA104	1	Business Communication	https://lms.adamasuniversitycdoe.com/mod/page/view.php?id=5677
8	MCA	OLMCA105T	1	Numerical & Statistical Methods	https://lms.adamasuniversitycdoe.com/mod/page/view.php?id=9832
9	MCA	OLMCA105P	1	Numerical & Statistical Methods Lab	https://lms.adamasuniversitycdoe.com/mod/page/view.php?id=9831
10	MCA	OLMCA106T	1	Software Engineering	https://lms.adamasuniversitycdoe.com/mod/page/view.php?id=15382
11	MCA	OLMCA201	2	Switching Circuits and Logic Design	https://lms.adamasuniversitycdoe.com/mod/page/view.php?id=6420
12	MCA	OLMCA202T	2	Object Oriented Programming with Java	https://lms.adamasuniversitycdoe.com/mod/page/view.php?id=6427
13	MCA	OLMCA202P	2	Object Oriented Programming with Java Lab	https://lms.adamasuniversitycdoe.com/mod/page/view.php?id=6428
14	MCA	OLMCA203T	2	Data Structures	https://lms.adamasuniversitycdoe.com/mod/page/view.php?id=6430
15	MCA	OLMCA203P	2	Data Structures Lab	https://lms.adamasuniversitycdoe.com/mod/page/view.php?id=6429
16	MCA	OLMCA204T	2	Database Management System	https://lms.adamasuniversitycdoe.com/mod/page/view.php?id=6432
17	MCA	OLMCA204P	2	Database Management System Lab	https://lms.adamasuniversitycdoe.com/mod/page/view.php?id=6433
18	MCA	OLMCA205	2	Discrete Mathematics	https://lms.adamasuniversitycdoe.com/mod/page/view.php?id=6431
19	MBA	OLMBAGM101	1	Organizational Behaviour	https://lms.adamasuniversitycdoe.com/mod/page/view.php?id=15307
20	MBA	OLMBAGF103	1	Managerial Economics	https://lms.adamasuniversitycdoe.com/mod/page/view.php?id=5822
21	MBA	OLMBAGM104	1	Financial Accounting for Managers	https://lms.adamasuniversitycdoe.com/mod/page/view.php?id=5824
22	MBA	OLMBAGM105	1	Marketing Management	https://lms.adamasuniversitycdoe.com/mod/page/view.php?id=5826
23	MBA	OLMBAGM106	1	Quantitative Techniques for Management	https://lms.adamasuniversitycdoe.com/mod/page/view.php?id=11060
24	MBA	OLMBAGSE107	1	Introduction to Data Analytics	https://lms.adamasuniversitycdoe.com/mod/page/view.php?id=5830
25	MBA	OLMBAGSE108	1	Entrepreneurship Development	https://lms.adamasuniversitycdoe.com/mod/page/view.php?id=5901
26	MBA	OLMBAGM109	1	Human Resource Management	https://lms.adamasuniversitycdoe.com/mod/page/view.php?id=5896
27	MBA	OLMGT21008	2	Business Communication	https://lms.adamasuniversitycdoe.com/mod/page/view.php?id=7545
28	MBA	OLMBAGM201	2	Operations Management	https://lms.adamasuniversitycdoe.com/mod/page/view.php?id=9978
29	MBA	OLMBAGM202	2	Financial Management	https://lms.adamasuniversitycdoe.com/mod/page/view.php?id=5897
30	MBA	OLMBAGM204	2	Sustainable Marketing	https://lms.adamasuniversitycdoe.com/mod/page/view.php?id=5899
31	MBA	OLMBAGF206	2	Economic Environment of Business	https://lms.adamasuniversitycdoe.com/mod/page/view.php?id=5898
32	MBA	OLMBAGSE207	2	IT Skills for Managers	https://lms.adamasuniversitycdoe.com/mod/page/view.php?id=5900
33	MBA	OLMBAGM208	2	Financial Services	https://lms.adamasuniversitycdoe.com/mod/page/view.php?id=8531
34	MBA	OLMBAGSE209	2	Foundations for E- Commerce	https://lms.adamasuniversitycdoe.com/mod/page/view.php?id=5832
35	MBA	OLMBAGM210	2	Research Methodology	https://lms.adamasuniversitycdoe.com/mod/page/view.php?id=8382
36	MBA	OLMBAGM212	2	Management Science	https://lms.adamasuniversitycdoe.com/mod/page/view.php?id=5820

Sr. No.	Program	Subject Code	Semester	Subject Name	Discussion Forum	Web Resources Link
1	MCA	OLMCA101T	1	Introduction to Programming	https://lms.adamasuniversitycdoe.com/mod/forum/view.php?id=584	https://lms.adamasuniversitycdoe.com/course/view.php?id=457&section=9
2	MCA	OLMCA101P	1	Introduction to Programming Lab	https://lms.adamasuniversitycdoe.com/mod/forum/view.php?id=619	
3	MCA	OLMCA102T	1	Computer Organization & Architecture	https://lms.adamasuniversitycdoe.com/mod/forum/view.php?id=620	https://lms.adamasuniversitycdoe.com/course/view.php?id=459&section=9
4	MCA	OLMCA102P	1	Computer Organization & Architecture Lab	https://lms.adamasuniversitycdoe.com/mod/forum/view.php?id=620	
5	MCA	OLMCA103T	1	Operating System	https://lms.adamasuniversitycdoe.com/mod/forum/view.php?id=621	https://lms.adamasuniversitycdoe.com/course/view.php?id=461&section=9
6	MCA	OLMCA103P	1	Operating System Lab	https://lms.adamasuniversitycdoe.com/mod/forum/view.php?id=622	
7	MCA	OLMCA104	1	Business Communication	https://lms.adamasuniversitycdoe.com/mod/forum/view.php?id=623	https://lms.adamasuniversitycdoe.com/course/view.php?id=463&section=8
8	MCA	OLMCA105T	1	Numerical & Statistical Methods	https://lms.adamasuniversitycdoe.com/mod/forum/view.php?id=626	https://lms.adamasuniversitycdoe.com/course/view.php?id=464&section=9
9	MCA	OLMCA105P	1	Numerical & Statistical Methods Lab	https://lms.adamasuniversitycdoe.com/mod/forum/view.php?id=627	
10	MCA	OLMCA106T	1	Software Engineering	https://lms.adamasuniversitycdoe.com/mod/forum/view.php?id=133	https://lms.adamasuniversitycdoe.com/course/view.php?id=558&section=10
11	MCA	OLMCA201	2	Switching Circuits and Logic Design	https://lms.adamasuniversitycdoe.com/mod/forum/view.php?id=636	https://lms.adamasuniversitycdoe.com/course/view.php?id=462&section=9
12	MCA	OLMCA202T	2	Object Oriented Programming with Java	https://lms.adamasuniversitycdoe.com/mod/forum/view.php?id=637	https://lms.adamasuniversitycdoe.com/course/view.php?id=463&section=9
13	MCA	OLMCA202P	2	Object Oriented Programming with Java Lab	https://lms.adamasuniversitycdoe.com/mod/forum/view.php?id=637	
14	MCA	OLMCA203T	2	Data Structures	https://lms.adamasuniversitycdoe.com/mod/forum/view.php?id=638	https://lms.adamasuniversitycdoe.com/course/view.php?id=464&section=9
15	MCA	OLMCA203P	2	Data Structures Lab	https://lms.adamasuniversitycdoe.com/mod/forum/view.php?id=638	
16	MCA	OLMCA204T	2	Database Management System	https://lms.adamasuniversitycdoe.com/mod/forum/view.php?id=639	https://lms.adamasuniversitycdoe.com/course/view.php?id=465&section=9
17	MCA	OLMCA204P	2	Database Management System Lab	https://lms.adamasuniversitycdoe.com/mod/forum/view.php?id=639	
18	MCA	OLMCA205	2	Discrete Mathematics	https://lms.adamasuniversitycdoe.com/mod/forum/view.php?id=630	https://lms.adamasuniversitycdoe.com/course/view.php?id=466&section=9
19	MBA	OLMBAGM101	1	Organizational Behaviour	https://lms.adamasuniversitycdoe.com/mod/forum/view.php?id=630	https://lms.adamasuniversitycdoe.com/course/view.php?id=466&section=9
20	MBA	OLMBAGM202	1	Management Science	https://lms.adamasuniversitycdoe.com/mod/forum/view.php?id=631	https://lms.adamasuniversitycdoe.com/course/view.php?id=467&section=9
21	MBA	OLMBAGF103	1	Managerial Economics	https://lms.adamasuniversitycdoe.com/mod/forum/view.php?id=632	https://lms.adamasuniversitycdoe.com/course/view.php?id=468&section=9
22	MBA	OLMBAGM104	1	Financial Accounting for Managers	https://lms.adamasuniversitycdoe.com/mod/forum/view.php?id=633	https://lms.adamasuniversitycdoe.com/course/view.php?id=469&section=9
23	MBA	OLMBAGM105	1	Marketing Management	https://lms.adamasuniversitycdoe.com/mod/forum/view.php?id=634	https://lms.adamasuniversitycdoe.com/course/view.php?id=470&section=10
24	MBA	OLMBAGM106	1	Quantitative Techniques for Management	https://lms.adamasuniversitycdoe.com/mod/forum/view.php?id=635	https://lms.adamasuniversitycdoe.com/course/view.php?id=471&section=10
25	MBA	OLMBAGSE107	1	Introduction to Data Analytics	https://lms.adamasuniversitycdoe.com/mod/forum/view.php?id=641	https://lms.adamasuniversitycdoe.com/course/view.php?id=472&section=10
26	MBA	OLMBAGSE208	2	Foundations for E- Commerce	https://lms.adamasuniversitycdoe.com/mod/forum/view.php?id=642	https://lms.adamasuniversitycdoe.com/course/view.php?id=473&section=10
27	MBA	OLMBAGM201	2	Operations Management	https://lms.adamasuniversitycdoe.com/mod/forum/view.php?id=110	https://lms.adamasuniversitycdoe.com/course/view.php?id=474&section=9
28	MBA	OLMBAGM109	2	Human Resource Management	https://lms.adamasuniversitycdoe.com/mod/forum/view.php?id=110	https://lms.adamasuniversitycdoe.com/course/view.php?id=475&section=10
29	MBA	OLMBAGM203	2	Financial Management	https://lms.adamasuniversitycdoe.com/mod/forum/view.php?id=110	https://lms.adamasuniversitycdoe.com/course/view.php?id=476&section=10
30	MBA	OLMBAGM204	2	Sustainable Marketing	https://lms.adamasuniversitycdoe.com/mod/forum/view.php?id=110	https://lms.adamasuniversitycdoe.com/course/view.php?id=477&section=10
31	MBA	OLMBAGF108	1	Business Communication	https://lms.adamasuniversitycdoe.com/mod/forum/view.php?id=110	https://lms.adamasuniversitycdoe.com/course/view.php?id=478&section=9
32	MBA	OLMBAGF206	2	Economic Environment of Business	https://lms.adamasuniversitycdoe.com/mod/forum/view.php?id=110	https://lms.adamasuniversitycdoe.com/course/view.php?id=479&section=10
33	MBA	OLMBAGSE207	2	IT Skills for Managers	https://lms.adamasuniversitycdoe.com/mod/forum/view.php?id=110	https://lms.adamasuniversitycdoe.com/course/view.php?id=480&section=8
34	MBA	OLMBAGSE102	1	Entrepreneurship Development	https://lms.adamasuniversitycdoe.com/mod/forum/view.php?id=110	https://lms.adamasuniversitycdoe.com/course/view.php?id=481&section=8
35	MBA	OLMBAGM209	2	Financial Services	https://lms.adamasuniversitycdoe.com/mod/forum/view.php?id=134	https://lms.adamasuniversitycdoe.com/course/view.php?id=544&section=10
36	MBA	OLMBAGM205	2	Research Methodology	https://lms.adamasuniversitycdoe.com/mod/forum/view.php?id=134	https://lms.adamasuniversitycdoe.com/course/view.php?id=500&section=10

Sr. No	Program	Subject Code	Semester	Subject Name	Link - MCQ
1	MCA	OLMCA101T	1	Introduction to Programming	https://lms.adamasuniversitycdoe.com/course/view.php?id=482&section=7
2	MCA	OLMCA101P	1	Introduction to Programming Lab	https://lms.adamasuniversitycdoe.com/course/view.php?id=509&section=4
3	MCA	OLMCA102T	1	Computer Organization & Architecture	https://lms.adamasuniversitycdoe.com/course/view.php?id=459&section=7
4	MCA	OLMCA102P	1	Computer Organization & Architecture Lab	https://lms.adamasuniversitycdoe.com/course/view.php?id=510&section=4
5	MCA	OLMCA103T	1	Operating System	https://lms.adamasuniversitycdoe.com/course/view.php?id=461&section=7
6	MCA	OLMCA103P	1	Operating System Lab	https://lms.adamasuniversitycdoe.com/course/view.php?id=511&section=4
7	MCA	OLMCA104	1	Business Communication	https://lms.adamasuniversitycdoe.com/course/view.php?id=463&section=6
8	MCA	OLMCA105T	1	Numerical & Statistical Methods	https://lms.adamasuniversitycdoe.com/course/view.php?id=464&section=7
9	MCA	OLMCA105P	1	Numerical & Statistical Methods Lab	https://lms.adamasuniversitycdoe.com/course/view.php?id=512&section=4
10	MCA	OLMCA106T	1	Software Engineering	https://lms.adamasuniversitycdoe.com/course/view.php?id=558&section=8
11	MCA	OLMCA201	2	Switching Circuits and Logic Design	https://lms.adamasuniversitycdoe.com/course/view.php?id=482&section=7
12	MCA	OLMCA202T	2	Object Oriented Programming with Java	https://lms.adamasuniversitycdoe.com/course/view.php?id=483&section=7
13	MCA	OLMCA202P	2	Object Oriented Programming with Java Lab	https://lms.adamasuniversitycdoe.com/course/view.php?id=532&section=4
14	MCA	OLMCA203T	2	Data Structures	https://lms.adamasuniversitycdoe.com/course/view.php?id=484&section=7
15	MCA	OLMCA203P	2	Data Structures Lab	https://lms.adamasuniversitycdoe.com/course/view.php?id=533&section=4
16	MCA	OLMCA204T	2	Database Management System	https://lms.adamasuniversitycdoe.com/course/view.php?id=485&section=7
17	MCA	OLMCA204P	2	Database Management System Lab	https://lms.adamasuniversitycdoe.com/course/view.php?id=534&section=4
18	MCA	OLMCA205	2	Discrete Mathematics	https://lms.adamasuniversitycdoe.com/course/view.php?id=486&section=7
19	MBA	OLMBAGM101	1	Organizational Behaviour	https://lms.adamasuniversitycdoe.com/course/view.php?id=466&section=7
20	MBA	OLMBAGM202	1	Management Science	https://lms.adamasuniversitycdoe.com/course/view.php?id=467&section=7
21	MBA	OLMBAGF103	1	Managerial Economics	https://lms.adamasuniversitycdoe.com/course/view.php?id=467&section=7
22	MBA	OLMBAGM101	1	Financial Accounting for Managers	https://lms.adamasuniversitycdoe.com/course/view.php?id=468&section=7
23	MBA	OLMBAGM101	1	Marketing Management	https://lms.adamasuniversitycdoe.com/course/view.php?id=470&section=8
24	MBA	OLMBAGM101	1	Quantitative Techniques for Management	https://lms.adamasuniversitycdoe.com/course/view.php?id=471&section=8
25	MBA	OLMBAGSE101	1	Introduction to Data Analytics	https://lms.adamasuniversitycdoe.com/course/view.php?id=472&section=8
26	MBA	OLMBAGSE202	2	Foundations for E- Commerce	https://lms.adamasuniversitycdoe.com/course/view.php?id=473&section=7
27	MBA	OLMBAGM202	2	Operations Management	https://lms.adamasuniversitycdoe.com/course/view.php?id=474&section=8
28	MBA	OLMBAGM101	1	Human Resource Management	https://lms.adamasuniversitycdoe.com/course/view.php?id=475&section=8
29	MBA	OLMBAGM202	2	Financial Management	https://lms.adamasuniversitycdoe.com/course/view.php?id=476&section=8
30	MBA	OLMBAGM204	2	Sustainable Marketing	https://lms.adamasuniversitycdoe.com/course/view.php?id=477&section=7
31	MBA	OLMGT21008	2	Business Communication	https://lms.adamasuniversitycdoe.com/course/view.php?id=478&section=6
32	MBA	OLMBAGF206	2	Economic Environment of Business	https://lms.adamasuniversitycdoe.com/course/view.php?id=479&section=8
33	MBA	OLMBAGSE202	2	IT Skills for Managers	https://lms.adamasuniversitycdoe.com/course/view.php?id=480&section=6
34	MBA	OLMBAGSE101	1	Entrepreneurship Development	https://lms.adamasuniversitycdoe.com/course/view.php?id=481&section=6
35	MBA	OLMBAGM202	2	Research Methodology	https://lms.adamasuniversitycdoe.com/course/view.php?id=500&section=8
36	MBA	OLMBAGM209	2	Financial Services	https://lms.adamasuniversitycdoe.com/course/view.php?id=544&section=8