2 Years Syllabus

MASTER OF COMPUTER APLICATION

SUBJECT CODE = MCA

UNIVERSITY DEPARTEMENT OF MATHEMATICS & MCA
DR. SHYAMA PRASAD MUKHERJEE UNIVERSITY

(UP-GRADATION OF RANCHI COLLEGE)

Implemented from Academic Session 2020-2022

UNIVERSITY DEPARTMENT OF MATHEMATICS & MCA

BOARD OF STUDIES

FOREWORD

A Meeting of the BOARD OF STUDIES was held in the UNIVERSITY DEPARTMENT OF MATHEMATICS & MCA, DR. SHYAMA PRASAD MUKHERJEE UNIVERSITY, RANCHI on 22.12.2020. All members participated in the syllabus approval meeting. The Draft Syllabus for MCA Programme was approved. It will be placed before the ACADEMIC COUNCIL of DR. SHAYAM PRASAD MUKHERJEE UNIVERSITY for final approval.

1. **Internal Members:**

   Dr. Ashoke Kumar Mahato
   Associate Professor,
   Dean Science, HOD Mathematics, Co-ordinator
   University Department of Mathematics & M.C.A.
   Dr. Shyama Prasad Mukherjee University, Ranchi

   Dr. Indra Nath Sahu
   Assistant Professor
   University Department of Mathematics & M.C.A.
   Dr. Shyama Prasad Mukherjee University, Ranchi

   Dr. Asit Kumar Mohapatra
   Assistant Professor
   University Department of Mathematics & M.C.A.
   Dr. Shyama Prasad Mukherjee University, Ranchi

2. **External Expert Members:**

   Dr. S. N. Singh
   Professor
   Department of Information Technology
   XISS, Ranchi

   Ms. Gaytri Kumari Gupta
   Assistant Professor
   Department of Information Technology
   Jamshedpur Women's College, Jamshedpur

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REGULATIONS

MASTER OF COMPUTER APPLICATIONS (2 Years)

1. Overview of MCA

a) The regulations herein specified are applied to Master of Computer Applications (MCA) programme offered by the Shyama Prasad Mukherjee University, Ranchi, through the University Department of Mathematics & MCA.

b) Master of Computer Application (MCA) has been restructured to be a two-year postgraduate course instead of the existing three-year postgraduate degree course. The change in the duration of the MCA course will not impact the existing curriculum and course structure severely.

c) Master of Computer Applications is a two year professional course offered for graduates wanting to learn modern programming language. A blend of theory and practical knowledge helps students to develop better and faster applications and designed to meet qualified professional for industry.

2. Time scale for academic activity

a) The basic units of time for academic activity for the MCA programme shall be a semester (July to December and January to June).

b) The department may schedule a summer programme during vacation of the department. There will be in general no formal classes in the summer programme.

3. Duration of Curriculum and Calendar

a) Master of Computer Applications (MCA) programme is of Two years duration. Each year shall be divided into two semesters. First semester shall normally begin in July and ends in December. Second semester shall normally begin in January and ends in June.

b) Each year, the university shall draw an academic calendar and the same shall be non-negotiable and strictly adhered to the academic calendar for the first year shall be handed over to each admitted student along with his/her university registration card. Second year academic calendar shall be made available during registration for third semester.

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c) The curriculum and syllabus shall be modified with approval of the academic council once in every two years to keep the same up-to-date. However, minor modifications can be done as and when necessary with the approval of Vice-Chancellor. The modification so done shall be placed to the immediate next academic council meeting for rectification.

d). A candidate may be permitted to complete MCA degree requirements in not more than 4 years i.e. maximum in 8 semesters.

4. Eligibility Criteria for Admission

a) The candidate must hold a bachelor's degree (with mathematics at 10+2 level) or BCA/B.Sc.(Computer Application)/B.Sc.(Information Technology) of a recognized University incorporated by an act of the central or state legislatures in India or other educational institutions established by an act of parliament registered under section (2f)/12(B) of UGC act 1956 or declared to be deemed of an university under section 3 of UGC act, 1956 or passed an equivalent qualification recognized by the ministry of HRD, Government of India.

b) The candidate must have secured at least 50% of marks (45% marks in case of candidates belonging to reserved category) in aggregate at the graduation level.

c) Candidates appearing for the final examination of their bachelor's programme can also apply and if selected can join the programme provisionally. At the time of counseling they must bring the certificates in original.

d) At the time of the counseling candidates will be required to show their original certificates and mark sheets of 10+2 and graduation level, MCA test admit card, caste certificate and any special category certificate, if any.

5. Scheme of Instruction

The scheme of instruction in Post-Graduate Programme shall be of the following forms of academic activity:
a) Theory
b) Sessional
c) Practical Training and Project Work
d) Seminar and Tutorial

a) Theory
A theory type of academic activity shall involve concepts, fundamental ideas and techniques, as laid down in text books or literature and which can be grasped through lectures and assignments. A theory type of course with about 45 contact

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periods in a semester shall enable participating student to earn one unit of academic credit provided that he/ she fulfils the attendance, and grade requirements as specified here in after.

b. Sessional

The following type of academic work will be covered in sessional:
- i) Laboratory Experiment
- ii) Design Exercise
- iii) Project
- iv) Term paper or any other academic work, the purpose of which would be to trained the student by practice, repeated use and hands on experience.

c. Practical Training and Project Work

After second semester during summer break either student should undergo Practical Training or do Mini Project. During the fourth semester of study, a student will be examined in the course "Project work".

1. Mini Project work may be done individually or in groups. However if project is done in groups, each student must be given a responsibility for a distinct module and care should be taken to see the progress of individual modules is independent of others.
2. Major Project work must be done individually.
3. Students should take guidance from an internal guide and prepare a Project Report on "Project Work" in 2 copies to be submitted to the Director of the Institute/Department by April. A separate file containing source-code listings should also be submitted. Before start of the project, every student should submit project synopsis in predefined format.
4. The Project Synopsis should contain an Introduction to Project, which should clearly explain the project scope in detail. Also, Data Dictionary, DFDs, ERDs, File designs and a list of output reports should be included.
5. The Project Work should be of such a nature that it could prove useful or be relevant from the commercial/management angle.
6. The Project report will be duly assessed by the internal guide and marks will be communicated by the Director to the University along with the marks of the internal credit for theory and practical.
7. The project report should be prepared in a format prescribed by the University, which also specifies the contents and methods of presentation.

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8. The major project work carries 200 marks. Distribution of Marks: Documentation-50, Design-50, Coding-50, Presentation-25, Viva-25. The Project Evaluation shall be conducted by two external examiners.

9. Project work can be carried out in the Institute/Department or outside with prior permission of the Institute/Department.

10. Project viva-voce by the University panel will be conducted in the month of May.

6) Attendance Requirement

All students must attend every lecture, practical classes and other activities of the Department. However, the attendance requirement will be a minimum of 75% of the classes actually held.

Absence during the semester

a. A student must inform the Co-ordinator concerned immediately of any instance of continuous absence from classes.

b. A student who is absent due to illness should approach the teachers concerned for make up quizzes, assignment and laboratory work.

c. A student who remains absents from a Sessional test due to illness approach the teacher concerned for makeup test immediately on return to class. The request should be supported with a medical certificate issued by a registered medical practitioner.

d. If a student is continuously absent from the Institute/Department for more than four weeks without permission of the head of the department concerned, his/her name will be removed from Institute/Department rolls.

7) Examination Assessment

Theory Paper-------------- 70 marks + 30 marks
70 marks ------------------ External evaluation (End Semester Exam)
30 marks------------------- Internal evaluation (Mid Sem exam & Attendance)

1. Mid Semester Examination (MSE):

- Written Examination - 20 marks of a paper
  There will be **two** groups of questions in written examinations of 20 marks. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of one mark each. **Group B will contain descriptive type five** questions of five marks each, out of which any three are to be answered.
- Attendance - 5 marks
- Assignment - 5 marks

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2. **End Semester Examination (ESE):**

There will be **two** groups of questions. **Group A is compulsory** and will contain two questions. Question No.1 will be very short answer type consisting of five questions of one mark each. Question No.2 will be short answer type five questions of five marks each, out of which any three are to be answered. **Group B will contain descriptive type** seven questions of ten marks each, out of which any four are to be answered.

3. **Sessional Examination------------ 50 Marks**

There should be one External and one internal examiner for each sessional Examination.

4. **Question Paper Pattern:**

The question paper shall consist of two sections: **Group A is compulsory** and will contain two questions. Question No.1 will be very short answer type consisting of five questions of one mark each. Question No.2 will be short answer type five questions of five marks each, out of which any three are to be answered. **Group B will contain descriptive type** seven questions of ten marks each, out of which any four are to be answered.

8) **Student Discipline**

Every student is required to observe a polite and disciplined behaviour both inside and outside the campus and should not indulge in any activity which would tend to bring down the prestige of the Institute/Department or disturb the peaceful and congenial environment of the campus.

An act of indiscipline on the part of the student may result into adequate discredit and a mention in his/her academic grade card and/or transcript.

Note: The department in consultation with the university shall have the right to change/modify any regulation or part thereof in the academic interest of the students.

9. **Eligibility for Appearing in Semester Examination**
   1. A student shall be eligible in an examination provided he/she pursues a regular course of study and attends at least 75% of class in each theory and sessional subject during the semester. The attendance shall be considered from the date of admission of the candidate in the institution. Attendance record will be compiled at the time of each test and the students with poor attendance will informed through notification. The guardian will also be informed through a

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letter before he/she is debarred for appearing university examination due to shortage of attendance.

2. Concessions: A student who has been absent for short periods on medical ground or due to participation in cultural, sports, other academic/official assignments in the interest of the Department/University with prior written permission of the head of the institution shall be permitted a maximum of additional concession of 10% in attendance and shall be eligible for appearing in examination with a minimum 65% of attendance in semester.

3. A student shall be admitted to any examination in a subject only if he/she has been registered for that subject.

4. A candidate shall be allowed in an examination only if he/she is issued an admit card for the relevant examination by the University/Department.

10. Promotion

Promotion to the 2nd year shall be permitted only with a maximum of four Backlog Papers from the preceding year (1st year). Further no entry to the next Semester.

Provision of Special examination:

Students keeping one or two backlogs in 3rd or 4th Semester can be given one special opportunity after declaration of 4th Semester result to clear their backlog papers so that they may go to Job.

Moderation of result:

Not withstanding anything contained elsewhere in the Regulations, the University shall have power to moderate the MCA results on the recommendations of the Examination Board and/or the academic council.

11. Final Result

Cumulative Grade Point Average

The Cumulative Grade Point Average (CGPA) will be calculated on the 10 point grading scale as follows:

Grade Point	Parentage of Marks	Grade Symbol	Grade Meaning
10	91-100	O	Outstanding
09	81-90	A+	Excellent
08	71-80	A	Very Good
07	61-70	B+	Good
06	51-60	B	Above Average
05	41-50	C	Average
04	40	P	Pass
00	Below 40	F	Fail or Absent

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a. For each Semester

Semester Grade Point Average (SGPA) $S(j) = \dfrac{\Sigma i \; C(i).G(i)}{\Sigma i C(i)}$

Where, *C(i)* denotes the total credits of the ith course. *G(i)* denotes the grade point earned by a student in i^{th} course and *j* indicates the semester.

b. For full course

Cumulative Grade Point Average CGPA$= \dfrac{\Sigma j \; C(j).S(j)}{\Sigma j C(j)}$

Where, *C(j)* denotes the total credits of the jth semester.

S(j) denotes the SGPA of the jth semester.

12. Conversion of Grades into Percentage and Equivalent Class/Distinction:

For the purpose of awarding class, the CGPA shall be converted to percentage marks using the formula, Percentage Marks = CGPA x 10

Category	CGPA	Class/Distinction
Students who successfully complete the MCA programme.	7.5 and above	First Class with Distinction
	6.0 and above	First Class
	5.0 and above	Second Class
	4.0 and above	Pass

The concerned teacher shall maintain all records for inspection by the University for at least one semester.

Others

a) Other provisions not covered under the present regulations shall be governed by the regulation for Master Examination in Arts, Science and Commerce of the university and if needed may be reviewed.

b) Any dispute or case not covered under the above regulations shall be referred to the Vice Chancellor whose decision shall be final.

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UNIVERSITY DEPARTMENT OF MATHEMATICS & MCA
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COURSE STRUCTURE
CHOICE BASED CREDIT SYSTEM (CBCS)

The proposed CBCS system has the potential of providing a choice of a wide spectrum of subjects/branches of subjects to students in pursuit of achieving their esteemed goals. This system has been globally accepted and now has become the need of the day. The UGC also has provided guidelines to the Universities for consideration and implementation of CBCS.

The University Department of Mathematics & MCA proposes the following courses and credits to be initiated at MCA w.e.f. the session 2020-22. The proposed system may be modified/improved in future according to the requirements.

COURSES OF STUDY FOR 2 YEARS M.C.A.
CORE PAPERS

Sem	FC, Core, Lang. Elect., Proff. Elect., Ability Enhancement Courses			Examination Structure			
	Paper	Paper code	Papers	Credit	Mid Sem. Theory (F.M.)	End Sem. Theory (F.M.)	End Sem. Practical/ Viva (F.M.)
I	Core Course	FCMCA101	Effective Organizational Communication	4	30	70	--
	Core Course	CCMCA102	Operating System	4	30	70	--
	Core Course	CCMCA103	Data Structure Through C++	4	30	70	--
	Core Course	CCMCA104	Database Management System	4	30	70	--
	Core Course	CCMCA105	Computer System Architecture	4	30	70	--
	Practical's on Core	CPMCA106	Lab on Unix/Linux command & Shell Prog.	4	30	--	70
	Practical's on Core	CPMCA107	Lab on DS through C++ programming	4	30	--	70
	Practical's on Core	CPMCA108	Lab on SQL/PL-SQL	4	30	--	70

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II	Elective Course	ECMCA201	Language Elective-I
			   A. Java Programming OR
			   B. Dot Net Programming
				4	30	70	--

	Core Course	CCMCA202	Discrete Mathematics with Graph Theory	4	30	70	--
	Core Course	CCMCA203	Software Engineering	4	30	70	--
	Core Course	CCMCA204	Automata Theory	4	30	70	--
	Core Course	CCMCA205	Data Communication & Computer Networks	4	30	70	--

	Practical's on Elective	EPMCA206	Language Elective-I Lab on
			   A. Java Programming Lab OR
			   B. Dot Net Programming
				4	30	--	70

	Practical's on Core	CPMCA207	Lab on HTML, CSS, Case Tools	4	30	--	70
	Practical's on Core	CPMCA208	Lab on Networking	4	30	--	70

III	Elective Course	ECMCA301	Language Elective-II
			   A. Advanced Java Programming OR
			   B. Advanced Dot Net Programming
				4	30	70	--

	Core Course	CCMCA302	Compiler Design	4	30	70	--
	Core Course	CCMCA303	PHP, Java Script & JQuery Programming	4	30	70	--
	Core Course	CCMCA304	Analysis & Design of Algorithm	4	30	70	--
	PROF EL-I	PRMCA305	Professional Elective-I A. Cloud Computing OR B. Data Warehousing and Data Mining OR C. Network Security and Cryptography OR D. Numerical and statistical Methods OR E. Distributed Database OR F. Internet Of Things	4	30	70	--

	Practical's on Elective	EPMCA306	Language Elective-II Lab on
			   A. Advanced Java Programming Lab OR
			   B. Advanced Dot Net Programming Lab
				4	30	--	70

	Practical's on Core	CPMCA307	Lab on PHP, Java Script & JQuery Programming	4	30	**--**	70
	Ability Enhancement Course	PRMCA308	Mini Project (SRS, Design, Implementation & Testing)	2	--	--	50
IV	Elective	ECMCA401	Python Programming	4	30	70	--
	PROF EL-II	PRMCA402	Professional Elective-II A. Pattern Recognition OR B. Artificial intelligence OR C. Optimization Techniques OR D. Computer Graphics OR E. Machine Learning F. Soft Computing	4	30	70	--
	Practical's on Core	EPMCA403	Lab on Python Programming	4	30	--	70
	Practical's on Core	CPMCA404	Lab on Computer Graphics	4	30	--	70
	Ability Enhancement Course	PRMCA405	Pre Submission Seminar	2	--	--	50
		PRMCA406	Major Project (SRS, Design, Implementation & Testing)	8	--	--	200

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DETAILED

SYLLABUS

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SEMESTER I   **8 Papers**
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Total 100 X 8 =800 Marks
</div>

I.   COMPULSORY FOUNDATION COURSE (FC)[FCMCA101]:

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(Credits: Theory-04)
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Marks: 30 (SIA: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: 3Hrs)=100	**Pass Marks (SIA:17 + ESE:28)=45**

Instruction to Question Setter for
Mid Semester Examination (MSE):
*There will be **two** groups of questions in written examinations of 20 marks. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type five** questions of five marks each, out of which any three are to be answered.*

End Semester Examination (ESE):
*There will be **two** groups of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of five questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type seven** questions of ten marks each, out of which any five are to be answered.*

Note: There may be subdivisions in each question asked in Theory Examinations
The Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Class Attendance Score (CAS) of 5 marks and (c) Class Performance Score (CPS) of 5 marks

Attendance Upto75%, 1mark; >75 to <=80, 2 marks;>80Attd.<=85,3 marks;>85Attd.<=90,4marks;>90Attd, 5 marks.

EFFECTIVE ORGANIZATIONAL COMMUNICATION

<div align="right">

Theory: 45 Lectures; Tutorial: 15 Hours
</div>

Unit - I Basics of communication: Definition, Objectives, Process and Elements, Flow of communication, Types of Communication, Principles of Effective communications, Barriers to Communication.

Unit - II Verbal & Non-verbal communication: Methods of verbal & non- Verbal communication and their difference.

Unit - III Listening Skills: Definition & importance of listening, Principles, Process, Types of listening, Barriers to effective listening.

Unit - IV   Essay writing

Unit - V   Presentation Principles, Slide Preparation, Report writing.

Unit - VI   Business/ Official correspondence.

Unit - VII   Preparation of Curriculum Vitae, Job Application and Interview Techniques.

 Reference Books:
   - Meenakshi Raman & Prakash Singh"Business communication".
   - R. and Panton F "The essence of effective communication"
   - Munter. M "Business communication: Strategy and skill".

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II. CORE COURSE – [CCMCA102]:   (Credits: Theory-04)

Marks: 30 (SIA: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: 3Hrs)=100	Pass Marks (SIA:17 + ESE:28)=45

Instruction to Question Setter for

Mid Semester Examination (MSE):

*There will be **two** groups of questions in written examinations of 20 marks. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type five** questions of five marks each, out of which any three are to be answered.*

End Semester Examination (ESE):

*There will be **two** groups of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of five questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type seven** questions of ten marks each, out of which any five are to be answered.*

Note: There may be subdivisions in each question asked in Theory Examinations
The Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Class Attendance Score (CAS) of 5 marks and (c) Class Performance Score (CPS) of 5 marks.

Attendance Upto75%, 1 mark; >75 to <=80, 2 marks; >80Attd.<=85, 3 marks; >85Attd.<=90, 4 marks; >90 Attd, 5 marks.

OPERATING SYSTEM   **Theory: 45 Lectures; Tutorial: 15 Hours**

Unit – I: Operating Systems Introduction: OS and the Computer System, Efficiency, System Performance and User Convenience, Classes of Operating Systems, Batch Processing Systems, Multiprogramming Systems, Time Sharing Systems, Real Time Operating Systems, Distributed Operating Systems, Modern Operating Systems.

Unit – II: Processes and Threads: Processes and Programs, Programmer view of Processes, OS view of Processes, Threads, Case studies of Processes and Threads.

Unit – III: Scheduling Concepts: Preliminaries, Non-preemptive Scheduling Policies and algo, Preemptive Scheduling Policies, Scheduling in Practice, Real Time Scheduling, Scheduling in Unix, Scheduling in Linux, Scheduling in Windows, Performance Analysis of Scheduling Policies.

Unit –IV Memory Management : Managing the Memory Hierarchy, Static and Dynamic Memory Allocation, Memory Allocation to a Process, Reuse of Memory, Contiguous Memory Allocation, Noncontiguous Memory Allocation, Paging, Segmentation, Segmentation with Paging, Kernel Memory Allocation, A Review of Relocation, Linking and Program Forms.

Unit -V Virtual Memory: Virtual Memory Basics, Demand Paging, Page Replacement algorithms, Memory Allocation to a Process, Shared Pages, Memory Mapped Files, Unix Virtual Memory, Virtual Memory using Segmentation.

Unit -VI File Systems: File System and IOCS, Files and File Operations, Fundamental File Organizations, Directory Structures, File Protection, Interface between File System and IOCS, Allocation

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of Disk Space and disk hardware, scheduling algo. Implementing File Access, Unix File System, Linux File System, Windows File System.

Unit VII   Deadlocks: Definition of Deadlocks, Deadlocks In Resources Allocation, Handling Deadlocks, Deadlocks Prevention and Avoidance.

Unit -VIII   Security and Protection: Overview of Security and Protection, Goals of Security and Protection, Security Attacks, Formal and Practical aspects of Security, Encryption, Authentication and Password Security, Access Descriptors and the Access Control Matrix, Protection Structures, Capabilities, Unix Security, Linux Security, Windows Security.

Reference Books:

- D.M. Dhamdhere- Operating Systems: A Concept-Based Approach, TMH,
  o Silberschatz et.al-Operating System Concepts, 6thEdn, John Wiley, Indian Reprint, 2003
  o Cronsley-Operating Systems: A Design-Oriented Approach, TMH, New Delhi,2002
  o H.M. Deitel-Operating Systems, 2ndEdn, Pearson Education, 2003.
  o A.S. Tanenbaum-Operating System: Design and Implementation, PHI, New Delhi,2002

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III. CORE COURSE – [CCMCA103]:   (Credits: Theory-04)

Marks: 30 (SIA: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: 3Hrs)=100   **Pass Marks (SIA:17 + ESE:28)=45**

Instruction to Question Setter for
Mid Semester Examination (MSE):
*There will be **two** groups of questions in written examinations of 20 marks. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type five** questions of five marks each, out of which any three are to be answered.*

End Semester Examination (ESE):
*There will be **two** groups of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of five questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type seven** questions of ten marks each, out of which any five are to be answered.*

Note: There may be subdivisions in each question asked in Theory Examinations
The Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Class Attendance Score (CAS) of 5 marks and (c) Class Performance Score (CPS) of 5 marks.

Attendance Upto75%, 1 mark; >75 to <=80, 2 marks; >80Attd.<=85, 3 marks; >85Attd.<=90, 4 marks; >90 Attd, 5 marks.

DATA STRUCTURE THROUGH C++   **Theory: 45 Lectures; Tutorial: 15 Hours**

Introduction: Introduction to Data Structures: Data Types, Abstract Data Types, Array, Arrays an abstract data type, Arrays row major and column major representation, Algorithm concepts.

Unit - I Linked Lists: Linear List Concepts, Linked List Concepts, Singly Linked List, Doubly Linked List, Circular Linked List, and Linked List Algorithms, Processing a Linked List, Linked List Implementation.

Unit – II Stacks: Basic concepts of Stack, Stack Operations, Stack Array Implementation, and Stack dynamic Implementation. Stack Linked List Implementation, Stack Applications (Expression evaluation, Conversion from infix to prefix and postfix).

Unit – III Queues: Basic concepts of Queue, Queue Operations, Ordinary Queue, Double-Ended Queue, Circular Queue, Priority Queue, Queue Array Implementation, Queue Linked List Design.

Unit - IV Recursion: Factorial–A Case Study, How Recursion Works, Designing Recursive Algorithms, another Case Study- Fibonacci Numbers.

Unit – V Trees Concepts: Basic Tree Concepts, Binary Trees, Binary Tree Traversals (Preorder, In-order, Post-Order), Expression Trees. Binary Search Trees, Operations of Binary Search Trees, AVL Trees, AVL Tree Rotations techniques, AVL Tree Operations.

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Unit – VI Graphs: Basic Graph Concepts, Graph Representations (Adjacency matrix, Incident matrix & adjacency lists), Graph Traversals (BFS and DFS).

Unit – VII Heaps & Multiway Trees: Heap Definition, Heap Structure, Heap Data Structure, Heap Algorithms, M-Way Search Trees, B-Trees, Simplified B-Trees.

Unit – VII Searching & Sorting Concepts: Linear Search, Binary Search, General Sort Concepts, Bubble Sort, Insertion Sort, Selection Sort, Quick Sort, Merge Sort.

Text Book:

R. F. Gilberg & B.A. Forouzan- Data Structures: A Pseudocode Approach with C++, 2nd Edn, Brooks/Cole-Thomson Learning, Indian Reprint.

Reference Books:

E. Horowitz et.al-Fundamentals of Data Structures in C++, Galgotia Publication, New Delhi

A. M. Berman- Data Structures vie C++, Oxford Univ. Press, Inc. Indian Reprint

M. T. Goodrich et.al- Data Structures and Algorithms in C++, John Wiley, Inc. Indian Reprint

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IV. <u>CORE COURSE - [CCMCA104]:</u>   (Credits: Theory-04)

Marks: 30 (SIA: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: 3Hrs)=100	**Pass Marks (SIA:17 + ESE:28)=45**

Instruction to Question Setter for
<u>*Mid Semester Examination (MSE):*</u>
*There will be **two** groups of questions in written examinations of 20 marks. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type five** questions of five marks each, out of which any three are to be answered.*

<u>*End Semester Examination (ESE):*</u>
*There will be **two** groups of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of five questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type seven** questions of ten marks each, out of which any five are to be answered.*

Note: There may be subdivisions in each question asked in Theory Examinations
The Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Class Attendance Score (CAS) of 5 marks and (c) Class Performance Score (CPS) of 5 marks.

Attendance Upto75%, 1 mark; >75 to <=80, 2 marks; >80Attd.<=85, 3 marks; >85Attd.<=90, 4 marks; >90 Attd, 5 marks.

DATABASE MANAGEMENT SYSTEM   **Theory: 45 Lectures; Tutorial: 15 Hours**

Unit 1: Introduction:
File systems versus Database systems, Advantages of DBMS, DBMS classification/types, DBMS structure, three schema DBMS architecture, Data Models, Data Independence, Data abstraction, Database Users, Database Schemas and Database Instances, Views and its advantages, Data dictionary, DBA and its functions, RDBMS, Difference between DBMS and RDBMS.

Unit 2: E-R-Model & Relational Model:
Entities and Entity Sets, Relationships and Relationship Sets, Mapping Cardinality, ER Diagram, Reducing ER Diagram to tables, Specialization, Generalization and Aggregation. Codd's rule, RDBMS Concepts, Types of Keys, Constraints Types, Relational database Scheme, Procedural & Non Procedural Languages, Relational Algebra, Relational Calculus.

Unit 3: SQL/PLSQL:
Basic Concepts, Basic SQL, Advance SQL, Database languages, Set operations, Aggregate Functions, Null Values, views, Sub-queries, Integrity Constraints(Entity integrity, Referential integrity and Domain constraint), SQL Constraints Types , Indexing , Cursors, Stored procedures and triggers.

Unit 4: Database Design:

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Pitfalls in relational database design, Normalization using functional dependency, Multivalued and join dependencies, Atomic values, Full and Partial Functional Dependency, 1NF, 2NF, 3NF, BCNF, 4NF, 5NF.

Unit 5: Transaction Processing and Concurrency Control:

DBMS Transaction, ACID Properties, States of Transaction, Serializability, DBMS Concurrency control, DBMS deadlock, Deadlock avoidance, Deadlock detection, Deadlock Prevention, , Schedules and Recovery, Locking and Timestamp Ordering for concurrency control**. [Q-1]**

Text Book:

1. Fundamentals of Database Systems "Ramez Elmasri", Pearson Education.

Reference Books:

1. Database Systems Concepts "A. Silberschatz, Korth", McGraw Hill.

2. Database Management Systems by RaghuRamakrishnan and Johannes Gehrke

3. SQL Solutions for IBM DBMS (Vnr Computer Library) by Bruce L. Larson

4. Database Management Systems (DBMS) by Icon Group International
5. Database Systems Concepts "KORTH"

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V. <u>CORE COURSE – [CCMCA105]:</u>   (Credits: Theory-04)

Marks: 30 (SIA: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: 3Hrs)=100	**Pass Marks (SIA:17 + ESE:28)=45**

Instruction to Question Setter for
<u>*Mid Semester Examination (MSE):*</u>
*There will be **two** groups of questions in written examinations of 20 marks. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type five** questions of five marks each, out of which any three are to be answered.*

<u>*End Semester Examination (ESE):*</u>
*There will be **two** groups of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of five questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type seven** questions of ten marks each, out of which any five are to be answered.*

Note: There may be subdivisions in each question asked in Theory Examinations
The Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Class Attendance Score (CAS) of 5 marks and (c) Class Performance Score (CPS) of 5 marks.

Attendance Upto75%, 1 mark; >75 to <=80, 2 marks; >80Attd.<=85, 3 marks; >85Attd.<=90, 4 marks; >90 Attd, 5 marks.

COMPUTER SYSTEM ARCHITECTURE   Theory: 45 Lectures; Tutorial: 15 Hours

Unit I - Parts of A Computer: Processor (CPU), memory subsystem, peripheral subsystem. The memory interface: memory subsystem. Parts of these interfaces integrated with the processor, and the remainder contained in the chip – set that supplements the processor. Two main parts of the processor apart from these interfaces: data path and control (which supervises the data path).

Unit II - Number System and Digital Logic Circuits:-
Number System: -Introduction, Number Systems, and Conversion between Number bases: Arithmetic System, Signed and Unsigned Numbers, Binary Coding.
Digital Logic Circuits: -Logic gates, Boolean algebra, Combination Circuits and Sequential Circuits, all types Flip-flops.
Digital Components: -IC, Decoders, Multiplexers

Unit – III Instruction Set Formats: Three–address and one address instructions and the corresponding data – path architectures, namely, general – purpose register architecture (the classic RISC) and accumulator architecture. Zero – address instructions and the stack architecture. Two – address instructions.

Unit – IV Introductory Machine: Modern computer design, Machines dating back to the1980's, reduced instruction set computers (RISC), complex instruction set computers (CISC).

Unit - V Hierarchy of Memory: Performance tradeoffs: fast, small, expensive memories (static RAM); slower, larger, inexpensive memories (DRAM); very slow and very cheap memories (magnetic and optical disks). Ideal memory: fast, inexpensive, unbounded size. Virtual memory, Cache memory.

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Unit - VI Pipelining & Peripherals: Improving the performance of a computer and increasing the usage of its subsystems by executing several instructions simultaneously. Analogy to assembly line. Influence of instruction set design on ease of pipelining. Difficulties with pipelining: structural, data and branch hazards. Branch prediction. Interconnecting peripherals with memory and processor.

Reference Books:

- o Computer System and Architecture Morishmano
- o Computer Fundamentals-Architecture and Organisation-B. Ram
- o Modern Computer Architecture-Galgotia
- o Computer Systems Organisation and Architecture-John D. Carpinelli,

  Pearson Computer System Architecture-P.V.S. Rao, PHI
- o Advanced Computer Architecture-A system design approach, Richard Y.Kain, Pearson

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VI.   PRACTICAL'S ON CORE – [CPMCA106]:   (Credits: Practical -04)

| Marks: 30 (SIA: 20 Exp. + 10 Viva) + 70 (ESE Pr: 6Hrs)=100 | Pass Marks (SIA:17 + ESE:28)=45 |

Instruction to Question Setter for
Semester Internal Assessment (SIA):
There will be **two** questions in Practical Examination of 3Hrs.out of which **any one** is to be answered. The questions in practical examination will be of equal to 20 marks and will be so framed that the students are able to answer them within the stipulated time. 10 marks will be awarded on the performance in viva voce.

End Semester Practical Examination (ESE Pr):
Lab: There will be **four** questions in Practical Examination of 3Hrs.out of which **any two** are to be answered. Student haveto Answer the given questions on Answer booklet and execute the answered programs/steps in computer with standard output.

The questions in practical examination will be of equal to 50 marks and will be so framed that the students are able to answer them within the stipulated time. 10 marks will be awarded on the performance in viva voce whereas 10 marks will be awarded on cumulative assessment which is further subdivided as 5 marks for Practical record and 5 marks for Attendance.

Assignment: The Assignment should be hand written (preferred)/ typed in A4 size paper. First three pages (i.e. front page+ acknowledgment + index) & Bibliography may be printout. *No Xerox copy is allowed.*

Marks Distribution:

LAB(Experiment + Answer script)   = 50 marks
Assignment/ Project + Attendance   =10 marks
Viva-voce   =10 marks
Note:
Attendance Upto75%, 1 mark; >75 to <=80, 2 marks; >80Attd.<=85, 3 marks; >85Attd.<=90, 4 marks; >90 Attd, 5 marks.

LAB ON UNIX/LINUX COMMAND & SHELL PROGRAMMING
                                                        Practical: 60 Hours

Unit – I UNIX Architecture and Command Usage: UNIX Architecture, Features, POSIX and single UNIX Specification, Locating Commands, Internal and External Commands, Command Structure, Flexibility of Command Usage, Man browsing and Documentation, **man-k**, **apropos**, **whatis.**

Unit – II General Purpose Utilities: cal, date, echo, printf, bc, script, Email Basics, mailx, passwd, who, uname, tty, sty.

Unit – III The File System: The File, The Parent-child Relationship, The HOME Variable, pwd, cd, mkdir, rmdir, Absolute and Relative Pathname, **ls,** The UNIX File System.

Unit - IV Handling Ordinary Files : Cat, cp, rm, mv, more,The Ip Subsystem, file, wc, od, cmp, comm, diff, dos2unix, unix2dos, Compressing and Archiving Files, gzip, gunzip, tar, zip, unzip.

Unit – V Basic Files Attributes: ls –l, ls –d, File Ownership and Permissions, chmod,Directory Permissions, Changing File Ownership.

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Unit – VI   The vi Editor: vi Basics, Input Mode, Saving Text and Quitting, Navigation, Editing Text, Undoing Last Editing Instruction (**U** and **U**), Repeating Last Command(**.**), Searching for Pattern(**/** and **?**), Substitution- Search and Replace(**:s**).

Unit - VII   The Shell : Shell's Interpretive Cycle, Shell Offerings, Pattern Matching, Escaping and Quoting, Redirection- The 3 standard files, **/dev/null** and **/dev/tty,** Pipes, **tee,** Command Substitution, Shell Variables.

Unit - VIII   The Process: Process Basics, **ps,** System processes(-e or–a), Mechanism of Process Creation, Internal and External Commands, Process States and Zombies, Running Jobs in Backgrounds, **nice,** Killing Processes with Signals, Job Controls, **cut, paste, sort, uniq, tr.**

Unit - IX   Essential Shell Programming : Shell Scripts, **read,** Command Line Arguments, **exit** and Exit Status of Commands, Logical Operation **&&** and **||,** The **if** Conditional, Using **test** and **[ ]** to evaluate Expressions, The **case** conditional, **expr, \$0, while, for, set** and **shift,** The Here Document, **trap,** Debugging Shell Script with **set –x,** Sample Validation and Data Entry Scripts.

Reference Books:
- Sumitabha Das- Unix Concepts & Applications, Tata McGraw Hills.
- Lowell Jay Arthur & Ted Burns-Unix Shell Programming, Galgotia Publication

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VII. PRACTICAL'S ON CORE - [CPMCA107]:   (Credits: Practical-04)

Marks: 30 (SIA: 20 Exp. + 10 Viva) + 70 (ESE Pr: 6Hrs)=100	Pass Marks (SIA:17 + ESE:28)=45

Instruction to Question Setter for
Semester Internal Assessment (SIA):
*There will be **two** questions in Practical Examination of 3Hrs.out of which **any one** is to be answered. The questions in ractical examination will be of equal to 20 marks and will be so framed that the students are able to answer them within the stipulated time. 10 marks will be awarded on the performance in viva voce.*

End Semester Practical Examination (ESE Pr):
***Lab**: There will be **four** questions in Practical Examination of 3Hrs.out of which **any two** are to be answered. Student have to Answer the given questions on Answer booklet and execute the answered programs/steps in computer with standard output. The questions in practical examination will be of equal to 50 marks and will be so framed that the students are able to answer them within the stipulated time. 10 marks will be awarded on the performance in viva voce whereas 10 marks will be awarded on cumulative assessment which is further subdivided as 5 marks for Practical record and 5 marks for Attendance.*

***Assignment**: The Assignment should be hand written (preferred)/ typed in A4 size paper. First three pages (i.e. front page+ acknowledgment + index) & Bibliography may be printout. <u>No Xerox copy is allowed.</u>*

Marks Distribution:

LAB(Experiment + Answer script)   *=50 marks*
Assignment/ Project + Attendance   *=10 marks*
Viva-voce   *=10 marks*

Note:
Attendance Upto75%, 1 mark; >75 to <=80, 2 marks; >80Attd.<=85, 3 marks; >85Attd.<=90, 4 marks; >90 Attd, 5 marks.

LAB ON DATA STRUCTURE THROUGH C++   **Practical: 60 Hours**

Students are expected to do programming for followings:
1. Array Implementation:
   - Insertions and Deletions elements in existing array.
   - Transpose of a Matrix.
   - Summation of left diagonal and right diagonal of a square matrix.
   - Maximum and Minimum value from a matrix.
   - Multiplications of two Matrixes.
   - Summation of two Matrixes.
2. Stack Implementation:
   - Static Implementations of Stack.
   - Dynamic Implementation of Stack.
   - Linked List Implementation of Stack.
3. Queue Implementation(Ordinary, DEQUE & Circular)
   - Static Implementations of Queue.
   - Dynamic Implementation of Queue.
   - Linked List Implementation of Queue.
4. Link List Implementation (Singly, Doubly, Circularly)

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5. Various Trees Implementation.

6. Sorting Implementation
   - Bubble sort, Insertion sort, Selection Sort, Exchange sort, Merge Sort, Quick sort.

7. Searching implementation
   - Linear search and Binary Search

Reference Books:

☐ S.K. Srivastava, Deepali Srivastava- Data Structure through C, BPB Publication.

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VIII. PRACTICAL'S ON CORE- [CCMCA108]:   (Credits: Practical-04)

Marks: 30 (SIA: 20 Exp. + 10 Viva) + 70 (ESE Pr: 6Hrs)=100	**Pass Marks (SIA:17 + ESE:28)=45**

Instruction to Question Setter for
Semester Internal Assessment (SIA):
There will be **two** *questions in Practical Examination of 3Hrs.out of which* **any one** *is to be answered. The questions in Practical examination will be of equal to 20 marks and will be so framed that the students are able to answer them within the stipulated time. 10 marks will be awarded on the performance in viva voce.*

End Semester Practical Examination (ESE Pr):
Lab: There will be **four** *questions in Practical Examination of 3Hrs.out of which* **any two** *are to be answered. Students have to Answer the given questions on Answer booklet and execute the answered programs/steps in computer with standard output. The questions in practical examination will be of equal to 50 marks and will be so framed that the students are able to answer them within the stipulated time. 10 marks will be awarded on the performance in viva voce whereas 10 marks will be awarded on cumulative assessment which is further subdivided as 5 marks for Practical record and 5 marks for Attendance.*

Assignment: The Assignment should be hand written (preferred)/ typed in A4 size paper. First three pages (i.e. front page+ acknowledgment + index) & Bibliography may be printout. No Xerox copy is allowed.

Marks Distribution:

LAB(Experiment + Answer script)	*= 50 marks*
Assignment/ Project + Attendance	*=10 marks*
Viva-voce	*=10 marks*

Note:
Attendance Upto75%, 1 mark; >75 to <=80, 2 marks; >80Attd.<=85, 3 marks; >85Attd.<=90, 4 marks; >90 Attd, 5 marks.

DBMS LAB   Practical: 60 Hours

SINGLE TABLE RETRIEVED /UPDATION

1. Select all information from Emp.
2. List all employees having salary within 1000 to 2000.
3. Display different job types.
4. List the employees in certain dept in alphabetical order.
5. Display all employees with   DR or LL in their names.
6. List an employee who has a job title of CLERK and earns more than $1100.
7. Update the Emp table and sets the department number for employees 7782 to 10.
8. Delete the development department from department table.
9. To retrieve name, salary and commission of employees where salary is less than or equal to their commission amount.
10. Display name &job title of all employees whose title is not CLERK, MANAGER or ANALYST.

Function & Concatenation

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1. Display name, salary and commission of all employees whose monthly salary is greater than their commission.
2. Select SMITH HAS WORKED IN POSITION OF CLERK IN DEPT 20

3. Produce the following

Employee	and	job
SMITH		**CLERK**
ALLEN		**SALESMAN**

4. Produce the following
   a. SMITH (CLERK)
   b. ALLEAN (SLAESMAN)
5. Find the maximum, minimum and average salaries of all employees.
6. Find how many managers are there without listing them.
7. Find out difference between highest and lowest salaries.
8. Find all departments which have more than 3 employees.
9. Calculate remainder of the ratio of salary to commission for all employees whose job title is a salesman.
10. List all the employees name and salaries increased by 15% and expressed as a whole number of dollars.

JOIN/ HAVING /GROUP BY /ORDER BY

1. List all the maximum and minimum salary of each job type.
2. Show only employees on grade 3.
3. Show all employees in DALLAS.
4. Display all employees name and department names in department name order.
5. List the following details of employees who earn   & 36000 a year or who are clerks.
6. To display kings employee number, department number and department location.
7. Display the department that has no employees.
8. Display the employees who earn less than their managers.
9. Display the name, location and departments of employees whose salary is more than 1500 a month.
10. Find all employees who joined before their manager.
11. Find the average salary and average total remuneration of each job type.

Queries using Data Functions

1. Display each employee name & hire date of Dept 20 hire date should be like June, Thirteenth 1983.
2. Display each employee name & hire date and salary review date, Assume salary review date is 1 year from hire date .output should be in ascending review date.
3. Compare the hire date for all employees who started in 1987.display the employee no, hire date and month started using the ROUND and TRUNC function.

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Nested queries

1. Display the employee name, job, salary of all employees whose salary is equal to minimum salary.
2. Display the five highest salaries in the company. Display the name and salary.
3. Find the employees .who earn the highest salary in each job type, sort in descending order of salary.
4. Find the employees .who earn the minimum salary for their job. Display the result descending order of salary.
5. Find the most recently hired employees in the department order by hire date.
6. Display details of employees who earn greater than the average of their department. Display the average salary also.
7. Display the employee name, job, salary of all employees whose salary is equal to minimum salary.
8. Display all the departments that have a minimum salary greater than that of department 20.
9. Display the employees whose salary is less than any clerk and who are not clerks.
10. Write a query to display a ' * ' against the row of the most recently hired employee
11. Display **ENAME, HIRE DATE and Column (MAXDATE)** showing

ENAME	HIREDATE	MAXDATE
SMITH	13-JUN-83	
JAMES	23-JUL-84 *	

USING THE & SUBSTITUTION VARIABLE

NOTE –1. Use a variable prefixed with an ampersand (&) to prompt the user for a value.
   2. Use single quotation marks for date and character value.

1. Create SQL statements to prompt the user for an employee number at runtime and displays employees s number, name, salary and department number for that employee .
2. Do a case sensitive search for a list of employee with a job that a job that the user enters.
3. Display the employee number and any other column and any conditions of employees specified by the user at a runtime from EMP Table.

Reference Books:

- An Introduction to Database System, C.J. Date, A. Kannan, S. Swamynathan, Pearson
- Database System Concept, Silberschtz, Korth and Sudershan.
- SQL/PL-SQL Ivan Bayross
- SQL/PL-SQL Deshpandey

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SEMESTER II   **8 Papers**
</div>

Total 100 x 8 = 800 Marks

I. LANGUAGE ELECTIVE - I [ECMCA201A]:   (Credits: Theory-04)

Marks: 30 (SIA: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: 3Hrs)=100	**Pass Marks (SIA:17 + ESE:28)=45**

Instruction to Question Setter for
Mid Semester Examination (MSE):
*There will be **two** groups of questions in written examinations of 20 marks. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type five** questions of five marks each, out of which any three are to be answered.*

End Semester Examination (ESE):
*There will be **two** groups of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be veryshort answer type** consisting of five questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type seven** questions of ten marks each, out of which any five are to be answered.*

Note: There may be subdivisions in each question asked in Theory Examinations
The Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Class Attendance Score (CAS) of 5 marks and (c) Class Performance Score (CPS) of 5 marks.

Attendance Upto75%, 1 mark; >75 to <=80, 2 marks; >80Attd.<=85, 3 marks; >85Attd.<=90, 4 marks; >90 Attd, 5 marks.

JAVA PROGRAMMING   Theory: 45 Lectures; Tutorial: 15 Hours

Unit I Fundamentals of Java programming: Introduction to Object Oriented Programming Language, Difference with C and C++, Benefits and Applications of OOP. Introduction to Java, Basic features of Java, Java Program Structure, JDK Tools, Java standard Library (JSL), Java Virtual Machine (Byte codes),

Unit II Java Tokens, Variables, Scope of Variables, Keywords, Identifiers, Punctuation Symbols, Unicode Characters, Data Types, Operators, Decision Making and Looping (if, if else, Nested if, if else-if else ladder, switch case, for, while, do while, break, & continue).

Class, Object, Constructors, Method Overloading, Inheritance, Overriding Methods, This and Super, Final Variables and Methods, Final Classes, Abstract Methods and Classes, Visibility Control

Unit III Class and Object: Declaring a Class, Creating an Object, Methods, Exploring new Operator, constructor its types, final, this Keyword, Recursion, Access Specifiers, Inheritance its types, super Keyword, Polymorphism, Overriding Methods, Runtime Polymorphism, Implementing Abstract classes, packages and interfaces.

Unit IV String: Concatenation and Changing Case, Sub strings Data Conversion String Buffer, Types of Array, Array of Objects, Wrapper Class, Vector Class.

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Unit V Exception Handling and Threads: Errors, Types of Errors, Exceptions, Exception handling code (Try, Catch and finally), Throwing our own Exception. Introduction to Threads, Creating Threads, Extending the Thread Class, Stopping and Blocking a Thread, Life Cycle of a Thread and Thread Priority

Unit VI File input and Output: File Class, Byte Stream Classes Reading from and Writing to a File, Character Stream Classes, Random Access File, Sequence Input Stream, Binary files.

Data Base Connectivity: ODBC API, JDBC Application Architecture, Java. SQL, obtaining a connection, step connecting Object, Working with Result, statement.

Unit VII Graphical User Interfaces: Creating User Interfaces, Overview of a Java GUI, Developing a Java GUI, Adding Functionality to a GUI, Improving GUI Layout.

Reference Books:

- o "An Introduction to Java Programming and Object Oriented Application Development" –Richard A. Jhonson.
- o Detail-Java How to Program, Pearson Education, New Delhi.
- o E. Balagurusamy-Java Programming, TMH, New Delhi, 2005.
- o James M. Sleek- Programming and Problem Solving with Java, Thomson Learning, Indian Edition, . Herbert Schildt- The Complete Reference, TMH

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OR

LANGUAGE ELECTIVE - I [ECMCA201B]:   (Credits: Theory-04)

Marks: 30 (SIA: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: 3Hrs)=100	Pass Marks (SIA:17 + ESE:28)=45

Instruction to Question Setter for
Mid Semester Examination (MSE):
*There will be **two** groups of questions in written examinations of 20 marks. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type five** questions of five marks each, out of which any three are to be answered.*

End Semester Examination (ESE):
*There will be **two** groups of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of five questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type seven** questions of ten marks each, out of which any five are to be answered.*

Note: There may be subdivisions in each question asked in Theory Examinations
The Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Class Attendance Score (CAS) of 5 marks and (c) Class Performance Score (CPS) of 5 marks.

(Attendance Upto75%, 1mark; 75<Attd.<80, 2 marks; 80<Attd.<85, 3 marks; 85<Attd.<90, 4 marks; 90<Attd, 5 marks).

.NET PROGRAMMING   **Theory: 45 Lectures; Tutorial: 15Hours**

Unit I .NET Introduction: Introduction of Language, Introduction of Web Application, Platform Dependence, Independence & Portability, Introduction of .NET Framework, Introduction of Compiler & MSIL, CLR, CLS, CTS,CLI.

UnitII OOPs Implementation: Encapsulation, Abstraction, Class & object, Relation b/w objects and reference variables, Method Overloading &Types of Methods. Description of Memory blocks: Stacks, Heap & Class Area. Constructors and Destructor & Garbage Collection. Using Scope & Dispose Method , Usage of this keyword , Static Data members, Constructors & methods, Relation & Implementing Has-A relation , Implementing Is-A relation using Inheritance , Method Overriding & Hiding, Static & Dynamic binding, Runtime polymorphism and generalization, Abstract classes & methods, Interfaces and Role based Inheritance, Usage of sealed, partial, out, ref, pram keyword , Namespace , Assembly & GAC, Property & Indexer, Windows Application, Delegates & Event, Event Handling, Windows App. Component. Object class and its role.

Unit III String Handling & Exception Handling: String class & concept   of Immutability, Pool of String Constants & its use, Common String operations, Use of String Builder. Difference b/w exception and error, Exception Handling & Robustness, Common Exceptions and Errors, Try and catch block, Exception handlers , throw keyword and its usage, Role of finally, Exception Class Methods & properties, Creating User defined Exceptions.

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UnitIV Multithreading in .NET: Multitasking and Multithreading, Process & thread , States of Thread , Thread based execution model of .NET Applications , Implementing User threads , Thread synchronization, Inter Thread communication , Thread Interrupting , Daemon Threads and theiruse.

UnitV Input Output Streams: Streams & their advantages over conventional input output, Reading&writingdatabytebybyte,linebyline,andinonego.RedirectingStandardinput&output streams, Serialization & Deserialization, Serialization Formatter, Xml Formatter, Binary Formatter, Soap Formatter, Json Formatter, File class and File System Interaction, Zip & Unzip Files.

UnitVI Reflection: Understanding object representation of classes, Loading classes dynamically, Instantiating classes indirectly, Obtaining information of classes dynamically, Invoking methods indirectly, Referencing data members indirectly, Overriding access policy and referencing privatemembers.

Unit VII Collection Framework: Role and Importance of Collection Framework, Index Based Collection Array List, Stack, Queue, Searching elements in List, Hash and Tree based collections , Role of equals and hashCode() methods, Role of Comparable interfaces, Type safety and Generics , Generic Collection . List, Stack, Queue, Dictionary, Linked List, Sorted List.

Reference Books:
- o Essential of .Net programming-C. Komalavalli, S.K. Sahu, Ane books
- o .Net 4.5 programming black book
- o Beginning .Net 3.5 in c# and VB, wrox
- o Programming in VB.net, Julia case Bradley, Anitac. Mellspaugh, McGraw hill

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II. CORE COURSE – [CCMCA202]:

(Credits: Theory-04)

Marks: 30 (SIA: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: 3Hrs)=100	Pass Marks (SIA:17 + ESE:28)=45

Instruction to Question Setter for
Mid Semester Examination (MSE):
*There will be **two** groups of questions in written examinations of 20 marks. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type five** questions of five marks each, out of which any three are to be answered.*

End Semester Examination (ESE):
*There will be **two** groups of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of five questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type seven** questions of ten marks each, out of which any five are to be answered.*

Note: There may be subdivisions in each question asked in Theory Examinations
The Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Class Attendance Score (CAS) of 5 marks and (c) Class Performance Score (CPS) of 5 marks.

Attendance Upto75%, 1 mark; >75 to <=80, 2 marks; >80Attd.<=85, 3 marks; >85Attd.<=90, 4 marks; >90 Attd, 5 marks.

DISCRETE MATHEMATICS WITH GRAPH THEORY

Theory: 45 Lectures; Tutorial: 15 Hours

Unit I Mathematical Preliminaries: Euclid's Algorithm, Fundamental Theorem of Arithmetic, Euclid's theorem, Congruence Modulo m, Fermat's & Euler's Theorems, Exponents & Logarithms.

Unit II Sets Concepts: Definition, Elements, Notations & construction of sets, Types of sets, set operations& properties, venn diagram, De-Morgan's laws.

Unit IIIFuzzy Algebra: Introduction, crisp sets & fuzzy sets, operation of fuzzy sets, union & intersection of two intervals- valued fuzzy sets, fuzzy relation.

Unit IV Combinatorics: Basic counting Principles, Factorial, permutation &combination, pigeonhole& extended pigeonhole principle, binomial theorem, combinatorial identities, multinomial coefficient.

Unit V Mathematical logic: propositions, connectives, equivalence of formula, well formed formula, tautologies', principle of duality, Normal form, Methods of proof, Mathematical Induction (M.I.), Predicate Calculus.

Unit VI Relation & Function: product sets, partition, binary relation in a set, domain &range, the matrix of relation & digraph, path in relation & digraph, Boolean matrices, Adjacency matrix of a relation, properties of relation, equivalence relation, Warshall's algorithm.
Sum & product of function, types of functions, compositions of function, inverse of functions, permutation function.

Unit VII: Lattice theory: Partial order set- Hasse diagram, isomorphism, duality, product of two sets, Lattice as poset- lattices as algebraic system, complete lattice, bounded lattice, sub lattice.

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Unit VIII: Graph Theory: Introduction, graph basics, digraph, sub graph, circuit & cycle, multiple path, connected Graph, eulerian graph, Hamiltonian graph, biconnected graph, Algebraic terms & operations used in graph theory. The Konigsberg Bridge problem, four color problem, three utilities problem.

Unit IX: Trees: Definitions, Forest, Rooted Graph, Properties of tree, Binary tree, spanning tree, BFS & DFS, Minimal spanning trees- Kruskal's Algorithm, Prim's Algorithm, Directed tree.

Reference:

☐ Discrete Mathematics with Graph theory, S.K. Yadav, Ane's Books Pvt. Ltd.
☐
☐ Graph Theory with Application, Bondy, J.A & U.S.R. Murty [1976], MacMillan

Kolman, Busby, Ross, Rehmann: *Discrete Matheamatical Structures*, 5/e, Pearson Education, 2006.

☐ *Discrete Mathematics, Swapan Kumar Chakraborty, bikashkantisarkar, Oxford University Press*

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III. CORECOURSE-[CCMCA203]:   (Credits:Theory-04)

Marks: 30 (SIA: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: 3Hrs)=100	Pass Marks (SIA:17 + ESE:28)=45

Instruction to Question Setter for
Mid Semester Examination (MSE):
*There will be **two** groups of questions in written examinations of 20 marks. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type five** questions of five marks each, out of which any three are to be answered.*

End Semester Examination (ESE):
*There will be **two** groups of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of five questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type seven** questions of ten marks each, out of which any five are to be answered.*

Note: There may be subdivisions in each question asked in Theory Examinations
The Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Class Attendance Score (CAS) of 5 marks and (c) Class Performance Score (CPS) of 5 marks.

Attendance Upto75%, 1 mark; >75 to <=80, 2 marks; >80Attd.<=85, 3 marks; >85Attd.<=90, 4 marks; >90 Attd, 5 marks.

SOFTWARE ENGINEERING   **Theory: 45 Lectures; Tutorial: 15 Hours**

Unit –I   Software Engineering Basics : Introduction to software engineering, Software components, Software characteristics, Software crisis, Software Engineering Process, Evolving Role of Software, Changing Nature of Software, Legacy Software, Software Engineering – A layered Technology.

Unit -II Introduction to Software Projects, Project Management Introduction, Software Development Life cycle(SDLC),Process Frame work, Process Patterns, Process Models, Waterfall Model, Incremental Process Models, Evolutionary Process Models, Specialized Process Models, Unified Process Model, Agile Process Model.

Unit –III Requirement Engineering: An approach to design and construction, Requirement specification, Initiating the Requirement Engineering Process, Functional and Non Functional Requirements, Developing Use case, Building the Analysis Model, Negotiating Requirements, Validating Requirements, SRS document, IEEE standards for SRS.

Unit –IV Design Engineering: Design Process Approaches, Design Concepts, Quality, Design Models, Pattern Based Software Design. Software design approaches, Cohesion and Coupling, Software Design Object oriented vs Function Oriented designs. User Interface Design –Input and Output Interfaces, Component –Based GUI Development, a User Interface design Methodology.

Unit –V Coding: Coding standards and guidelines, Code review, Code walkthrough and code inspection.

Unit –VI Testing Strategies and Testing Tactics: Strategic Approach to software Testing, Test Strategies for conventional and Object Oriented Software, Validation Testing System Testing, Requirement based testing, Acceptance testing, White Box Testing(structural testing), Basis Path Testing,

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Control Structure Testing, Black Box Testing(functional testing), Object Oriented Testing Methods, Test coverage, Test plan

Unit –VI Metric for process and Estimation Techniques: Process metrics, software size oriented metrics, Function point based measures, cyclomatic complexity measures, Software Project Estimation, Decomposition Techniques, Empirical Estimation Models, Estimation for Object Oriented Projects Specialized Estimation Techniques, COCOMO models.

Unit –VII   Software Quality and Configuration Management: Quality Concepts, Software Quality Assurance, Software Reliability, Software Configuration Management, SCM Repository, SCM Process, Quality metrics, Verification and Validation, Version control, Change management, version control.

Computer Aided Software Engineering (CASE) Tools, Types of CASE tools.

Current trends in Software Engineering – Software engineering for projects and products.

Introduction to web engineering and agile process. Reverse engineering, Re-engineering

Text Book:
☐   Roger S. Pressman – "Software Engineering – A Practitioner's Approach", TMH, 7th Ed.

Reference Books:

‒ R. Fairley – " Software Engineering – Concepts –TMH, 2nd Ed.
‒ Rajib Mall, "Software Engineering" PHI.
☐ P. Jalote" An Integrated Approach to Software Engineering", Narosa.
☐ R.Khurana, "Software Engineering", Vikas Publishing House.
   Ian Sommerville – "Software Engineering", 7thEdn., Pearson Education.

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IV. <u>CORE COURSE - [CCMCA204]:</u>   (Credits: Theory-04)

Marks: 30 (SIA: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: 3Hrs)=100	Pass Marks (SIA:17 + ESE:28)=45

Instruction to Question Setter for
<u>*Mid Semester Examination (MSE*</u>*):*
*There will be **two** groups of questions in written examinations of 20 marks. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type five** questions of five marks each, out of which any three are to be answered.*

<u>*End Semester Examination (ESE):*</u>
*There will be **two** groups of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be veryshort answer type** consisting of five questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type seven** questions of ten marks each, out of which any five are to be answered.*

Note: *There may be subdivisions in each question asked in Theory Examinations*
The Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Class Attendance Score (CAS) of 5 marks and (c) Class Performance Score (CPS) of 5 marks.

Attendance Upto75%, 1 mark; >75 to <=80, 2 marks; >80Attd.<=85, 3 marks; >85Attd.<=90, 4 marks; >90 Attd, 5 marks.

AUTOMATA THEORY   **Theory: 45 Lectures; Tutorial: 15 Hours**

Unit –I Finite Automata : Finite Automata, capability & limitations of FSM, Deterministic Finite Automata , Non-Deterministic Finite Automata, NFA with e-moves, Equivalence of DFA and NDFA, NFA from regular expressions, regular expressions from DFA, Moore versus Mealy m/c , Kleen's Theorem.

Unit – II Regular languages & Regular Grammars: Regular Expressions- Formal Definition & Language associated with It. Criterion for Regularity, Relation between Regular expression & Regular Language , Closure properties of regular grammar. Identifying Nonregular Language-using pigeonhole principle, Pumping Lemma.

Unit – III Context Free Grammars: Introduction, definition, Regular Grammar, Derivation trees, Ambiguity, Normal Forms, Applications.

Unit – IV Pushdown Automata : Definition, Moves, Instantaneous Descriptions, Language recognized by PDA, Deterministic PDA, Acceptance by final state & empty stack, Equivalence of PDA , Pumping lemma for CFL, Intersection and Complements of CFL.

Unit – V Turing Machines: Definition and examples, Computing Partial Functions with Turing Machine(TM), Combining TMs, Variations of TMs, Multi-tape TMs, Non-deterministic TM, Universal TM, Church Thesis.

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Unit – VI Recursively Enumerable Languages: Recursively Enumerable and Recursive, Enumerating Language, Context Sensitive and Chomosky Hierarchy.

Unit – VII Unsolvable Problems and Computable Functions: Non-recursive Language and unsolvable Problems, Halting Problem, Rice Theorem, Post Correspondence Problem.

Text Books:

☐ J.E. Hopcroft and J.D. Ullman -"Introduction to Automata Theory, Languages &Computation", Narosa.

Reference Books:

☐

 K.L.P Mishra & N. Chandrasekharan -"Theory of Computer Science", PHI

☐

 Peter Linz – "An Introduction to Formal Language and Automata", Narosa

☐

 C.K. NAGPAL- Formal Language & Automata Theory, Oxford University Press

☐

 Vivek Kulkarni- Theory of Computation, Oxford University Press

☐

 DasradhRamaiah K. – Introduction to Automata Theory & Compiler Design, PHI

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V. CORE COURSE – [CCMCA205]:   (Credits: Theory-04)

Marks: 30 (SIA: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: 3Hrs)=100	Pass Marks (SIA:17 + ESE:28)=45

Instruction to Question Setter for
Mid Semester Examination (MSE):
*There will be **two** groups of questions in written examinations of 20 marks. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type five** questions of five marks each, out of which any three are to be answered.*

End Semester Examination (ESE):
*There will be **two** groups of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be veryshort answer type** consisting of five questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type seven** questions of ten marks each, out of which any five are to be answered.*

Note: There may be subdivisions in each question asked in Theory Examinations
The Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Class Attendance Score (CAS) of 5 marks and (c) Class Performance Score (CPS) of 5 marks.

Attendance Upto75%, 1 mark; >75 to <=80, 2 marks; >80Attd.<=85, 3 marks; >85Attd.<=90, 4 marks; >90 Attd, 5 marks.

DATA COMMUNICATION AND NETWORKING   Theory: 45 Lectures; Tutorial: 15 Hours

Unit - I Data Communications and Networking Basics: Fundamental concept of Communications Model, Data Communications & Networking.
Protocol Architecture: A Basic Protocol Architecture, OSI, the TCP/IP Protocol Architecture

Unit - II Transmission of Data: Concepts and Terminology, Analog and Digital Data Transmission, Transmission Impairments, Channel Capacity.
Guided and Wireless Transmission: Guided Transmission Media, Wireless Transmission, Wireless Propagation, Line-of-Sight Transmission.

Unit - III Signal Encoding Techniques: Digital Data Digital Signals, Digital Data Analog Signals, Analog Data Digital Signals, Analog Data Analog Signals.
Digital Data Communication Techniques: Asynchronous and Synchronous Transmission, Types of Errors, Error Detection, Error Correction, Line Configurations, Interfacing.

Unit –IV Data Link Control: Flow Control, Error Control, High-Level Data Link Control (HDLC).
Multiplexing: Frequency Division Multiplexing, Synchronous Time Division Multiplexing, Statistical Time Division Multiplexing

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Unit – V Circuit Switching and Packet Switching: Switching Networks, Circuit-Switching Networks, Circuit-Switching Concepts, Control Signaling, Soft switch Architecture, Packet-Switching Principles, X.25, Frame Relay.

Unit –VI   Asynchronous Transfer Model: Protocol Architecture, ATM Logical Connections, ATM Cells, Transmission of ATM Cells, ATM Service Categories, ATM Adaptation Layer.

Unit –VI   Routing in Switched Networks: Routing in Circuit-Switching Networks, Routing inPacket-Switching Networks, Least-Cost Algorithms

Text Book :

☐   W. Stallings - Data and Computer Communications, 7th Edn., Pearson Edn./ PHI, New Delhi, 2006

Reference Books:

☐   B. A. Forouzan - Data Communications and Networking, 4th Edn. TMH, New Delhi 2006

☐   P.C. Gupta – Data Communications and Computer Networks, PHI, New Delhi 2006.

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VI. LANGUAGE ELECTIVE-I LAB [EPMCA306A]:   (Credits: Practical-04)

Marks: 30 (SIA: 20 Exp. + 10 Viva) + 70 (ESE Pr: 6Hrs)=100	Pass Marks (SIA:17 + ESE:28)=45

Instruction to Question Setter for
Semester Internal Assessment (SIA):
*There will be **two** questions in Practical Examination of 3Hrs.out of which **any one** is to be answered. The questions in practical examination will be of equal to 20 marks and will be so framed that the students are able to answer them within the stipulated time. 10 marks will be awarded on the performance in viva voce.*

End Semester Practical Examination (ESE Pr):
*Lab: There will be **four** questions in Practical Examination of 3Hrs.out of which **any two** are to be answered. Student have to Answer the given questions on Answer booklet and execute the answered programs/steps in computer with standard output. The questions in practical examination will be of equal to 50 marks and will be so framed that the students are able to answer them within the stipulated time. 10 marks will be awarded on the performance in viva voce whereas 10 marks will be awarded on cumulative assessment which is further subdivided as 5 marks for Practical record and 5 marks for Attendance.*

Assignment: The Assignment should be hand written (preferred)/ typed in A4 size paper. First three pages (i.e. front page+ acknowledgment + index) & Bibliography may be printout. No Xerox copy is allowed.

Marks Distribution:
LAB(Experiment + Answer script)   = 50 marks
Assignment/ Project + Attendance   =10 marks
Viva-voce   =10 marks
Note: *Attendance Upto75%, 1 mark; >75 to <=80, 2 marks; >80Attd.<=85, 3 marks; >85Attd.<=90, 4 marks; >90 Attd, 5 marks.*

LAB ON JAVA PROGRAMMING   **Practical: 60 Hours**

Write a program in java for followings:

1. To illustrate Arithmetic, Relational, Boolean, Bitwise, Shift Operators.
2. To illustrate Precedence Rule.
3. To use "If-else" & "Switch Cases"
4. To use "For Loop", "While Loop" & "Do- While loop".
5. To use "Break" & "Labeled Break".
6. For class declaration & object initialization.
7. For calculating "simple interest" using class, object & methods.
8. For method overloading.
9. For matrix multiplication
10. For Nested classes.
11. For default constructor
12. For parameterized constructor
13. For constructor overloading

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14. For final
15. For single Inheritance
16. For multilevel inheritance
17. For super
18. For hierarchical inheritances
19. For multiple inheritance using interface class
20. For hybrid inheritances using interface class
21. For method of overriding.
22. For Encapsulation.
23. For Abstract Class & Abstract Methods.
24. For class implementing interface.
25. For using inbuilt packages. E.g. Fact, Static, Import etc.
26. For Wrapper classes.
27. For Declaration, Creation, Finding Length, Comparison, Region Matching, Index of Character, occurrence of particular string, character at particular position, Test for Equality related to string.
28. For Try-Catch, Multiple Catch, Throw &Rethrow Exception, Finally, User Defined Exception, Exception Encapsulation.
29. For creating Thread.
30. File Handling
31. Database Connectivity

Reference Books:

☐ Deitel-Java How to Program, Pearson Education, New Delhi.
E. Balagurusamy-Java Programming, TMH, New Delhi, 2005.

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OR

LANGUAGE ELECTIVE - I LAB [EPMCA306B]:   (Credits: Practical-04)

Marks: 30 (SIA: 20 Exp. + 10 Viva) + 70 (ESE Pr: 6Hrs)=100	Pass Marks (SIA:17 + ESE:28)=45

Instruction to Question Setter for
Semester Internal Assessment (SIA):
There will be **two** questions in Practical Examination of 3Hrs.out of which **any one** is to be answered. The questions in practical examination will be of equal to 20 marks and will be so framed that the students are able to answer them within the stipulated time. 10 marks will be awarded on the performance in viva voce.

End Semester Practical Examination (ESE Pr):
Lab: There will be **four** questions in Practical Examination of 3Hrs.out of which **any two** are to be answered. Students have to Answer the given questions on Answer booklet and execute the answered programs/steps in computer with standard output.

The questions in practical examination will be of equal to 50 marks and will be so framed that the students are able to answer them within the stipulated time. 10 marks will be awarded on the performance in viva voce whereas 10 marks will be awarded on cumulative assessment which is further subdivided as 5 marks for Practical record and 5 marks for Attendance.

Assignment: The Assignment should be hand written (preferred)/ typed in A4 size paper. First three pages (i.e. front page + acknowledgment + index) & Bibliography may be printout. No Xerox copy is allowed.

Marks Distribution:
   LAB(Experiment +Answerscript)   = 50marks
   Assignment/ Project+ Attendance   =10marks
   Viva-voce   =10marks

Note:
(Attendance Upto75%, 1mark; 75<Attd.<80, 2 marks; 80<Attd.<85, 3 marks; 85<Attd.<90, 4 marks; 90<Attd, 5 marks).

LAB ON .NET PROGRAMMING   Practical: 60Hours

1. Introduction to .NET Framework, Introduction to Compiler & MSIL, CLR, CLS, CTS, CLI. Encapsulation, Abstraction, Class & object, variables. Stacks, Heap &ClassArea.

2. Constructors and Destructor & Garbage Collection. Using Scope & Dispose Method, Usage of this keyword, Static Data members, Constructors &methods,

3. Inheritance, Method Overriding & Hiding, Static & Dynamic binding, Runtime polymorphism andgeneralization,

4. Abstract classes & methods, Interfaces and Role based Inheritance, Usage of sealed, partial, out, ref, pram keyword, Namespace, Assembly & GAC, Property &Indexer,

5. Windows Application, Delegates & Event, Event Handling, Windows App. Component. String class & concept of Immutability, Pool of String Constants & its use, Common String operations, Use of StringBuilder.

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6. Exception Handling: try and catch block, throw keyword and its usage, finally, Exception Class Methods & properties, Creating User-defined-Exceptions.

7. Multitasking and Multithreading, Process & thread , States of Thread , Thread based execution model of .NET Applications , Implementing User threads , Thread synchronization, Inter Thread communication , Thread Interrupting , Daemon Threads and their use.

8. Streams & their advantages over conventional input output, Reading & writing data byte by byte, line by line, and in one go. Redirecting Standard input & output streams, Serialization & Deserialization, Serialization Formatter, Xml Formatter, Binary Formatter, Soap Formatter, Json Formatter, File class and File System Interaction, Zip &Unzip Files.

9. Object representation of classes, Loading classes dynamically, Instantiating classes indirectly, Obtaining information of classes dynamically, Invoking methods indirectly, Referencing data members indirectly, Overriding access policy and referencing private members.

10. Collection Framework, Index Based Collection Array List, Stack, Queue , Use Define Collection, Map Based Collection Use of Key & Value pair (Entry), Hash Table, Sorted List, Searching elements in List, Hash and Tree based collections, Role of equals and hash code() methods, Role of Comparable interfaces, Type safety and Generics, Generic Collection. List, Stack, Queue, Dictionary, Linked List, Sorted List.

Reference Books:
- Beginning .Net 3.5 in C# and VB, Wrox
- Programming in VB.Net, Julia case Bradley, Anitac. Mellspaugh, McGraw hill

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VII. CORE COURSE – [CPMCA207]:   (Credits: Practical -04)

Marks: 30 (SIA: 20 Exp. + 10 Viva) + 70 (ESE Pr: 6Hrs)=100	Pass Marks (SIA:17 + ESE:28)=45

Instruction to Question Setter for
Semester Internal Assessment (SIA):
*There will be **two** questions in Practical Examination of 3Hrs.out of which **any one** is to be answered. The questions in practical examination will be of equal to 20 marks and will be so framed that the students are able to answer them within the stipulated time. 10 marks will be awarded on the performance in viva voce.*

End Semester Practical Examination (ESE Pr):
*Lab: There will be **four** questions in Practical Examination of 3Hrs.out of which **any two** are to be answered. Student have to Answer the given questions on Answer booklet and execute the answered programs/steps in computer with standard output.*

The questions in practical examination will be of equal to 50 marks and will be so framed that the students are able to answer them within the stipulated time. 10 marks will be awarded on the performance in viva voce whereas 10 marks will be awarded on cumulative assessment which is further subdivided as 5 marks for Practical record and 5 marks for Attendance.
Assignment: The Assignment should be hand written (preferred)/ typed in A4 size paper. First three pages (i.e. front page + acknowledgment + index) & Bibliography may be printout. No Xerox copy is allowed.
Marks Distribution:
LAB(Experiment +Answerscript)   *= 50marks*
Assignment/ Project+Attendance   *=10marks*
Viva-voce   *=10marks*

Note:
(Attendance Upto75%, 1mark; 75<Attd.<80, 2 marks; 80<Attd.<85, 3 marks; 85<Attd.<90, 4 marks; 90<Attd, 5 marks)..

LAB ON HTML, CSS, CASE TOOLS   **Practical: 60 Hours**

UnitI: Introduction: HTML tags, pairs, singular tags, commands lists, graphics, tables, linking documents, images as hyperlinks,frames.

UnitII: Introduction to HTML5: The canvas, Geolocation, Audio and video, Forms, Location storage, Web workers, Web applications, Micro-data, Creating and accessing a canvas, Writing text to canvas, Using paths, Filling areas, Clip method, The is Point In Path method, Working with curves, Manipulating images, Editing at pixel level, Advanced graphical Effects, Transformations.

UnitIII: HTML5 audio and video: About codecs, The <audio> elements, Supporting non- HTML5 browsers, The <video>element.

UnitIV: Other HTML5 features: Geolocation and the GPS service, Local storage, Web workers, Offline web application, Drag and Drop, Cross document Messaging, Micro-data, HTML5tags.

UnitV: Introduction toCSS: Importing style sheet, Using semicolons, CSS rules, Style types, CSS selectors, CSS cascade, Measurements, Fonts and typography, Managing text styles, CSS colours, Pseudo classes, Shorthand rules, Box model andlayout.

UnitVI: Advanced CSS with CSS3: Attributes Selectors, Box sizing property, CSS3 background, Multiple backgrounds, CSS3 borders, Box shadows, Element overflows, Multicolumn layout, Colours and opacity, Text Effects, Web fonts, Google web fonts, Transformations, 3D transformations,Transitions.

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UnitVII: CASE tools: UML DIAGRAM, Class Diagram, Object and class concept, Link, association, Generalization, Inheritance, Aggregation, Collaboration Diagram, Deployment Diagram

State Modeling: Events, States, State diagram, Interaction Model

Interaction Model: Use case model, Sequence Diagram, Activity Diagram.

.

Reference Books:
- ❑ David karlins, Dreamweaver CSS.5 Mobile and Web Development with HTML5, CSS3, and
- ❑ JQuery, SPD Richard C.LEE, William M. tepfenhart, UML and C++, PHI
  Richard C.LEE, William M. tepfenhart, UML and C++, PHI
- − M R Blaha, Rumbaugh, "Object – Oriented Modeling & Design With UML"

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<div align="center">

SEMESTER III   **8 Papers**

</div>

Total (100 x 7 = 700 Marks + 50 Marks) = 750Marks

I. <u>LANGUAGE ELECTIVE - II [ECMCA301A]:</u>   (Credits: Theory-04)

Marks: 30 (SIA: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: 3Hrs)=100	Pass Marks (SIA:17 + ESE:28)=45

Instruction to Question Setter for
Mid Semester Examination (MSE):
*There will be **two** groups of questions in written examinations of 20 marks. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type five** questions of five marks each, out of which any three are to be answered.*

End Semester Examination (ESE):
*There will be **two** groups of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of five questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type seven** questions of ten marks each, out of which any five are to be answered.*

Note: There may be subdivisions in each question asked in Theory Examinations
The Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Class Attendance Score (CAS) of 5 marks and (c) Class Performance Score (CPS) of 5 marks.

Attendance Upto75%, 1 mark; >75 to <=80, 2 marks; >80Attd.<=85, 3 marks; >85Attd.<=90, 4 marks; >90 Attd, 5 marks.

ADVANCE JAVA PROGRAMMING   Theory: 45 Lectures; Tutorial: 15 Hours

Unit I Components and Facilities or Rich Graphical User Interface: Programming with the JFC, Swing API Components, JComponents Class, Dialog boxes, Panels, Labels, Checkboxes, Menus, Toolbars and Actions, Sliders, Spinners, Progress bars, Scrollbars, List and Combo boxes, Text-entry Components, Colour and File Choosers, Tables and Trees, Printing with 2D API, Java Print Service API.

Unit II Using Relational Database: Introduction, Best Practices for Programming for Databases, JDBC Drivers for RDBM Systems, SQL to Java type Mapping, Understanding the Database used in this chapter, Using the **java.sql** API, Coding Transactions, Using the **javax.sql** API, Connection Pooling.

Unit III XML: Introduction, XML structure, XML example document with SAX, Parsing an XML Document with DOM, Generating an XML document with DOM, Validating XML Documents using DTD and XML schema, Transforming XML using XSLT.

Unit IV Building Web Applications: Introduction, The technology of Web, J2EE Web Application Packaging, Servlets, The Servlet API, The User Experience, Building a Web App with Continuity, Framework for Building Web Applications, Building Robust Web Apps.

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Unit V Enterprise JavaBeans: Introduction, Enterprise Programming, what are EJBs? Session EJBs, EJB Clients, Entity EJBs, Message Driven Beans, EJB Transactional Characteristics, EJB Security, Best Practices for Designing EJB-Based Application.

Reference Books:

Wigglesworth & McMillan – JavaTM Programming Advanced Topics, 3rdEdn., India Edition, Thomson Education, New Delhi, 2007

Uttam K. Roy- Advanced Java Programming, Oxford University Press, 2015

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OR

LANGUAGE ELECTIVE - II [ECMCA301B]:   (Credits: Theory-04)

Marks: 30 (SIA: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: 3Hrs)=100	Pass Marks (SIA:17 + ESE:28)=45

Instruction to Question Setter for
Mid Semester Examination (MSE):
*There will be **two** groups of questions in written examinations of 20 marks. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type five** questions of five marks each, out of which any three are to be answered.*

End Semester Examination (ESE):
*There will be **two** groups of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of five questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type seven** questions of ten marks each, out of which any five are to be answered.*

Note: There may be subdivisions in each question asked in Theory Examinations
The Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Class Attendance Score (CAS) of 5 marks and (c) Class Performance Score (CPS) of 5 marks. "

Attendance Upto75%, 1 mark; >75 to <=80, 2 marks; >80Attd.<=85, 3 marks; >85Attd.<=90, 4 marks; >90 Attd, 5 marks.

ADVANCE .NET PROGRAMMING   Theory: 45 Lectures; Tutorial: 15 Hours

Unit I: Windows application programming: Introduction, Controls, Menus and Context Menus, Dialog, Form Inheritance, Other Misc. Topics.

Unit II: Database Connectivity Using ADO.NET: Overview of Database & Database Server, Introduction of SQL Server 2008, DML & DDL Query. Join, Trigger, Procedure & function.

Ado.NET API. Connected Layer. Connection, Command & Data Reader. Disconnected Layer. Adaptor, Data Set, Table, Row & Column. ODBC, OLEDB, Oracle Client. Connectivity with Oracle, Access, Excel & MySql. Connection Pooling.

Unit III: Web Application Programming Using Asp.NET : Web application architecture, Static Web Page, Application Life Cycle ,Dynamic Page, Page Life Cycle & Event Method, Html & Server Control ,Server Control Event Life Cycle, State Management, Url Rewriting, Hidden Form Field, View State, Session, Cookies & Application. Global class & Event Method.

Uploading & Downloading, Page Directives, Data Source, Sql Data Source, Xml Data Source, Site Map Data Source & Object Data Source. Data Control, Data List, Details View, Form View, Grid View, List View& Repeater. Validation Control, Compare Validator, Custom Validator, Range Validator, Regular Expression Validator & Validation Summary. Navigation, Menu, Site Map Path & Tree View.

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Login Control & Membership, Login, Login Name, Login Status, Login View, Password Recovery, Change Password, Create User Wizard. Ajax Extensions, Script Manager, Update Panel, Update Progress & Timer. Globalization & localization. Master Page & Style them. Mail, SMTP, POP3

Unit IV MVC3: Introduction to MVC3, The Model-View-Controller Pattern, Differences Between, MVC and Web Forms Applications, Building a Simple MVC Application with Visual Studio Working with Controllers and Actions.

Introduction to Controllers: Using a Controller to Manage the Application, Controller Actions, Returning Action Results.

Creating MVC Models: Data and Business Rules in MVC Applications, Creating a Custom Data Model.

Data Validation and Data Annotations, Using MVC Views, Views in ASP.NET MVC, Creating Views, Adding Content to a View, HTML Helpers and Action Filters ,Using HTML Helpers in MVC ,Creating a Custom Helper Using Action Filters, Creating a Custom Filter , Routing and URLs , Customizing Application URLs , Creating Route Constraints , Routine and Web Forms Using MVC and AJAX and JQuery, Integrating Client-Side Script with MVC Using the MVC AJAX Helpers, Working with JSONData.

Unit V Networking: Introduction of Networking, Understanding socket and port, Tcp Client & Tcp Listener, TCP/IP based networking, HTTP based networking, Http Request, Http Response

Unit VI Remoting: Application Domain, Remotable & Non Remotable, Object, Marshal-By- Reference, Server Activated Object (SAO), Single Call, Singleton, Client Activated Object , Channels, Tcp Channel, Service Configuration &Hosting

Unit VII LINQ: Introduction to LINQ, LINQ expressions, Using via extension methods, Filtering, Sorting, Aggregation, Skip and Take operators, Joins, Extension methods , Object initialization syntax ,Anonymous types , Lambda expressions, Deferred Execution, Benefits and drawbacks , IEnumerablevsIQueryable , Using acrosstiers, Data Projection , Single result value , Existing types, Anonymous types , Grouping, LINQ to XML, New XML classes , Generating XML, Querying XML, Using data projection, Combining with X Path , LINQ to SQL, Attributes and mapping, Creating a Data Context, Deferred loading, Saving changes, Inserts and deletes ,Transactions.

Reference Books:

Pro ASP.NET MVC5, 5thedition, Adam Freeman, Apress publication

.NET 4.5 programming (6-in-1) Black book, Dreamtech Press.

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II. COURE COURSE - [CCMCA302]:

(Credits: Theory-04)

Marks: 30 (SIA: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: 3Hrs)=100	Pass Marks (SIA:17 + ESE:28)=45

Instruction to Question Setter for
Mid Semester Examination (MSE):

*There will be **two** groups of questions in written examinations of 20 marks. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type five** questions of five marks each, out of which any three are to be answered.*

End Semester Examination (ESE):

*There will be **two** groups of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of five questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type seven** questions of ten marks each, out of which any five are to be answered.*

Note: There may be subdivisions in each question asked in Theory Examinations
The Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Class Attendance Score (CAS) of 5 marks and (c) Class Performance Score (CPS) of 5 marks.

Attendance Upto75%, 1mark; >75 to <=80, 2 marks;>80Attd.<=85,3 marks;>85Attd.<=90,4marks;>90Attd, 5 marks.

COMPILER DESIGN   **Theory: 45 Lectures; Tutorial: 15 Hours**

Unit-I Introduction to compilers: introduction, design of language, evolution of compilers, stages of compilation.

Unit-II Lexical analysis: Introduction, Alphabets and token in computer language, representation of tokens and regular expression, Token recognition and finite state automata, implementation, Error recovery

Unit-III Syntax Analysis: Introduction, context free grammar and structure of language , parse tree, abstract syntax tree, ambiguity

Unit–IV Top down parsing: Top down parsing by recursive descent, LL(1), First and Follow

Unit–IV Bottom up parsing: LR(0) parsing, SLR(1),general LR(1) parsing algorithm, LALR(1) generator tool (yacc)

Unit-V Run time storage organization: Introduction, scope and lifetime of variables, symbol table, storage allocation, static allocation, heap allocation, stack allocation, parameter passing mechanism

Unit-VI Semantic analysis: Attribute and Attribute grammar, Data type and type checking

Unit-VII Intermediate code generation: need for intermediate code, types of intermediate code, representation by graphical method, Three address code, quadruples, triples, indirect triples

Unit-VIII Optimization and Code generation: Data flow analysis using flow graph, Optimization of basic block, loops in flow graph, peephole optimization, issues in code generation, directed acyclic graph representation, code generation from intermediate code.

References

Compiler Design , K Muneeswaran , Oxford.

Compiler Principle , Technique and Tools, Aho, Sethi, Ullman, Pearson.

Introduction to Automata and Compiler Design, DasarthramaiyaK. , PHI.

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III. <u>COURE COURSE - [CCMCA303]</u>: (Credits: Theory-04)

Marks: 30 (SIA: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: 3Hrs)=100	Pass Marks (SIA:17 + ESE:28)=45

Instruction to Question Setter for
<u>*Mid Semester Examination (MSE):*</u>
*There will be **two** groups of questions in written examinations of 20 marks. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type five** questions of five marks each, out of which any three are to be answered.*

<u>*End Semester Examination (ESE):*</u>
*There will be **two** groups of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of five questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type seven** questions of ten marks each, out of which any five are to be answered.*

Note: There may be subdivisions in each question asked in Theory Examinations
The Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Class Attendance Score (CAS) of 5 marks and (c) Class Performance Score (CPS) of 5 marks.

Attendance Upto75%, 1 mark; >75 to <=80, 2 marks; >80Attd.<=85, 3 marks; >85Attd.<=90, 4 marks; >90 Attd, 5 marks.

PHP, JAVA SCRIPT & JQUERRY PROGRAMMING

Theory: 45 Lectures; Tutorial: 15 Hours

Unit I PHP: Introduction, hardware and software requirements, benefits of PHP, Comments, Syntax, Variables, Constants, Commands, Scope of variable. Expressions, Operators, Conditional statement, Looping constructs, Casting, Dynamic linking. PHP functions, Including and Requiring files, PHP version compatibility, PHP objects. Numerically indexed and Associative arrays, Foreach loop, Array functions. Using printf –precision setting, string padding, using sprint;, Date and Time functions, File handling. MySql Database connectivity in Object Oriented manner. PHP configuration file, Error tracking and debugging.

Unit II Introduction to MySQL: MySQL basics, MySQL Architecture, Database design and terms, Data types, Functions, Accessing MySQL via command line, Indexes, Accessing MySQL via phpMyAdmin, Normalization, Relationship, Transactions, Backing up and restoring. Connecting to MySQL server, Checking for Errors, Closing the MySQL Server Connection

Accessing MySQL using PHP: Process, Connecting to MySQL database, Insert, update, Deleting a record, Displaying form, Querying database, Running program, Table operation-creation, description, drop; Operations on data- addition, retrieving, updating, deletion; Preventing hacking attempts, Using mysql procedurally.

Unit III Form handling: Building form, Retrieving submitted data, Various attributes in HTML5- auto complete, autofocus, placeholder, required, override, width and height, form, list, min and max, step; Colour input type, Number and range input types.

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Cookies, Sessions and Authentication: Using cookies in PHP, HTTP authentication, Using sessions.

Unit IV Exploring JavaScript: , Introduction to JavaScript, ways to use JavaScript, Working with events, Client-side Validation, JavaScript and HTML text, Using comments, Semicolon, Variables, Operators, Variable typing, Functions, Global variables, Using DOM, Using console.log, Using alert, Writing into elements, Using documents. write, Expressions, Literals, Variables, Operators, The with statement, Using on error, Using try…catch, Conditional statements, Looping constructs, Explicit casting, Functions, Objects, Arrays.

Unit V JAVASCRIPT and PHP validation: Validating user input, Regular Expressions, Meta characters and Fuzzy character matching, Parentheses grouping, Character class, Negation, General modifiers, Redisplaying form after validation.

Unit VII Introduction to JQUERY: JQuery, Syntax, Selectors, Handling events, validations, JQUERY Forms, Event functions and properties, Special effects, Manipulating DOM, Dynamically applying classes, Modifying dimensions, DOM traversal, Using Ajax, Plug-ins.

Reference Book:

- Learning Php, Mysql& Java Script, Robin Nixon, O'reilly
- PHP Bible, (Author) Tim Converse , Joyce Park.
- Beginning PHP5(Author) David Mercer, Allan Kent , Steven Nowicki, Clark Morgan,Wankyu Choi

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IV. <u>CORE COURSE- [CCMCA304]</u>: (Credits: Theory-04)

Marks: 30 (SIA: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: 3Hrs)=100	Pass Marks (SIA:17 + ESE:28)=45

Instruction to Question Setter for
<u>*Mid Semester Examination (MSE):*</u>
*There will be **two** groups of questions in written examinations of 20 marks. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type five** questions of five marks each, out of which any three are to be answered.*

<u>*End Semester Examination (ESE):*</u>
*There will be **two** groups of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of five questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type seven** questions of ten marks each, out of which any five are to be answered.*

Note: There may be subdivisions in each question asked in Theory Examinations
The Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Class Attendance Score (CAS) of 5 marks and (c) Class Performance Score (CPS) of 5 marks.

Attendance Upto75%, 1 mark; >75 to <=80, 2 marks; >80Attd.<=85, 3 marks; >85Attd.<=90, 4 marks; >90 Attd, 5 marks.

ANALYSIS & DESIGN OF ALGORITHM   Theory: 45 Lectures; Tutorial: 15 Hours

Unit – I   Elementary Algorithmic & Asymptotic Notation: Problems and instances, The efficiency of algorithms, Average and worst-case analyses, Elementary operations. A notation for "the order of", other asymptotic notation, Conditional asymptotic notation, Asymptotic notation with several parameters, Asymptotic notation Operations.

Unit – II   Algorithm Analysis: Control structures analysis, using a barometer, Supplementary examples, Average-case analysis, Amortized analysis, solving recurrences

Unit – III   Greedy Algorithms: Greedy algorithm's characteristics, Graphs: Minimum spanning trees, Shortest paths, The knapsack problem, scheduling concepts.

Unit – IV   Divide-and-conquer: Multiplying large integers, the general template, Binary search, Sorting, Finding the median, Matrix Multiplication, Exponentiation

Unit – V   Dynamic Programming: Calculation of binomial coefficient, The World Series, Making change, the principle of optimality, the knapsack problem, shortest paths, chained matrix multiplication

Unit – VI   Exploring Graphs: Graphs and games: An introduction, Traversing trees, Depth-first search: Undirected graphs, Depth-first search: directed graphs, Breadth-first search, Backtracking, Branch-and-bound, the minimax principle.

Unit – VII Probabilistic Algorithms: Introduction, Probabilistic does not imply uncertain, Expected versus average time, Pseudorandom generation, Numerical probabilistic algorithms, Monte Carlo algorithms, Las Vegas algorithms.

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Text Book:

o   G Brassard & P Bratley - Fundamentals of Algorithmics PHI, New Delhi, 2005

Reference Books:

☐   o   E.Horowitz. et.al.- Fundamentals of Computer Algorithms, Galgotia Publication Pvt. Ltd., New.Delhi, 2004

☐   o   J.Kleinberg& E. Tardos – Algorithm Design, Pearson Education, New Delhi, 2006

☐   o   T.H. Cormen et.al. – Introduction to Algorithms – PHI, New Delhi, 2005 S. Dasgupta et.al. – Algorithm, TMH, New Delhi – 2007

☐

o   S. Sahani – Data Structures, Algorithms and Applications in C++ 2nd Edition, Universities Press (India) Pvt. Ltd., 2005

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V. **PROFESSIONALELECTIVE - I [PRMCA305A]:**   (Credits: Theory-04)

Marks: 30 (SIA: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: 3Hrs)=100	Pass Marks (SIA:17 + ESE:28)=45

Instruction to Question Setter for
Mid Semester Examination (MSE):

*There will be **two** groups of questions in written examinations of 20 marks. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type five** questions of five marks each, out of which any three are to be answered.*

End Semester Examination (ESE):

*There will be **two** groups of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of five questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type seven** questions of ten marks each, out of which any five are to be answered.*

Note: There may be subdivisions in each question asked in Theory Examinations
The Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Class Attendance Score (CAS) of 5 marks and (c) Class Performance Score (CPS) of 5 marks.

(Attendance Upto75%, 1mark; 75<Attd.<80, 2 marks; 80<Attd.<85, 3 marks; 85<Attd.<90, 4 marks; 90<Attd, 5 marks).

A. CLOUD COMPUTING   **Theory: 45 Lectures; Tutorial: 15Hours**

Unit-I   Introduction: Essentials, Benefits and need for Cloud Computing - Business and IT Perspective - Cloud and Virtualization - Cloud Services Requirements - Cloud and Dynamic Infrastructure - Cloud Computing Characteristics CloudAdoption.

Unit-II   Cloud Models: Cloud Characteristics - Measured Service - Cloud Models - Security in a Public Cloud Public versus Private Clouds - Cloud Infrastructure SelfService.

Cloud as a Service: Gamut of Cloud Solutions - Principal Technologies - Cloud Strategy Cloud Design and Implementation using SOA - Conceptual Cloud Model - Cloud Service Defined.

Unit-III Cloud Solutions: Cloud Ecosystem - Cloud Business Process Management - Cloud Service Management - Cloud Stack - Computing on Demand (CoD) – Cloudsourcing.

Unit-IV   Cloud Offerings & Management : Information Storage, Retrieval, Archive and Protection - Cloud Analytics Testing under Cloud - Information Security - Virtual Desktop Infrastructure - Storage Cloud. Resiliency – Provisioning - Asset Management - Cloud Governance - High Availability and Disaster Recovery - Charging Models, Usage Reporting, Billing and Metering.

Unit-V   Cloud Virtualization Technology: Virtualization Defined - Virtualization Benefits - Server Virtualization - Virtualization for x86 Architecture - Hypervisor Management Software - Logical Partitioning (LPAR) - VIO Server - Virtual InfrastructureRequirements.

Cloud Virtualization: Storage virtualization - Storage Area Networks - Network-Attached storage - Cloud Server Virtualization - Virtualized Data Center.

Unit-VI Cloud and SOA: SOA Journey to Infrastructure - SOA and Cloud - SOA Defined - SOA and IaaS - SOA-based Cloud Infrastructure Steps - SOA Business and ITServices.

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UnitVII   Cloud Infrastructure Benchmarking: OLTP Benchmark - Business Intelligence Benchmark - e-Business Benchmark - ISV Benchmarks - Cloud Performance Data Collection and Performance Monitoring Commands - Benchmark Tools.

Text Book:
  ☐ K. Saurabh– Cloud Computing, 2ndEdn, Wiley India,2014.

Reference Books:
  ☐ T. Velte, A. Velte and R. Elsenpeter-Cloud Computing: A Practical Approach, McGraw Hill, India.
  ☐ R. Buyya, J. Broberg-Cloud Computing: Principles and Paradigms, Wiley. Derrick Rountree ,
  ☐ LLeanacastrillo – The Basicsof Cloud Computing,Syngress
  ☐ ArshdeepBahga, Vijay Madisetti – Cloud Computing: A Hands onn Approach, Universities press
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OR

PROFESSIONAL ELECTIVE - I [PRMCA405B]:   (Credits: Theory-04)

Marks: 30 (SIA: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: 3Hrs)=100	Pass Marks (SIA:17 + ESE:28)=45

Instruction to Question Setter for
Mid Semester Examination (MSE):

*There will be **two** groups of questions in written examinations of 20 marks. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type five** questions of five marks each, out of which any three are to be answered.*

End Semester Examination (ESE):

*There will be **two** groups of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of five questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type seven** questions of ten marks each, out of which any five are to be answered.*

Note: There may be subdivisions in each question asked in Theory Examinations
The Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Class Attendance Score (CAS) of 5 marks and (c) Class Performance Score (CPS) of 5 marks.

Attendance Upto75%, 1 mark; >75 to <=80, 2 marks; >80Attd.<=85, 3 marks; >85Attd.<=90, 4 marks; >90 Attd, 5 marks.

B. DATA WAREHOUSING AND DATA MINING   Theory: 45 Lectures

Unit –I Introduction : Data Warehousing Definition, Multidimensional Data Model, OLAP Operation, OLTP Operation, Warehouse Scheme, Data Warehousing Architecture, Metadata, OLAP ENGINE, Data warehouse Backend Process, OLAP Vs OLTP.

Unit –II Data Warehousing: Overview, Definition, Delivery Process, Multi-Dimensional Data Model, Data Cubes, Stars, Snow Flakes, Fact Constellations, Concept hierarchy, Process Architecture, 3 Tier Architecture, Data Mining.

Unit –III Data Mining: Introduction, Data Mining Definition, Motivation behind Data mining, Why is it important, KDD Vs, Data Mining, Data Mining Functionalities , DBMS Vs DM, other related area, DM Technique, Other Mining Problem, Issue and challenges are in DM, DM Application area, DM Application, Case Study.

Unit-IV Classification and Prediction: - Issues Regarding Classification and Prediction, Classification by Decision Tree , Rule Based Classification , Classification by Back propagation, Support Vector Machines, Lazy Learners , Prediction , Accuracy and Error Measures , Evaluating the Accuracy of a Classifier or Predictor.

Unit –V Clustering Techniques: Introduction, Clustering Paradigram, Generalized , Partition Algorithm, K-Medoid Algorithm, K- Mean Algorithm , CLARA, CLARANS, DBSCAN, BIRCH, CURE, Categorical Clustering Algorithms, STIRR, ROCK, CACTUS.

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Unit –VI Mining Association Rule in Large Database: Introduction, What is an Association Rule, Method to discover association Rule, A Priori Algorithm, Partition Algorithm, Linear-Search algorithm, Dynamic item set Counting Algorithm, FP Tree Growth?

Unit –VII Decision Trees: Introductions, Tree Construction Principle, Best split splitting Indices, Splitting criteria, Decision Tree Construction with Presenting, Prunesing Technique, Integration of Pruning Technique and Construction.

Text Book

A.K. Pujari, A Data Mining Technique, University Press (India) Limited, 2001

Reference Book

- o A Hand and M. Kamber, ?Data Mining Concept and Technique? , Morgan Kauffman Publishers, Else River India, New Delhi, 2003.
- o RecherdJ, Roiger and Michance W. Creatz, Data Mining: A tutorial Based Primer, Addision Wesley, 2003.

I.   M.H. Dienham, Data Mining: Introductory and Advanced Topics, Pentice Hall 2003.
II.   Alex Berson and Stephen J. Smith "Data Warehousing, Data Mining & OLAP", Tata McGraw – Hill Edition, Tenth Reprint 2007.

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OR

PROFESSIONAL ELECTIVE - I [PRMCA305C]: (Credits: Theory-04)

Marks: 30 (SIA: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: 3Hrs)=100	Pass Marks (SIA:17 + ESE:28)=45

Instruction to Question Setter for

Mid Semester Examination (MSE):
*There will be **two** groups of questions in written examinations of 20 marks. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type five** questions of five marks each, out of which any three are to be answered.*

End Semester Examination (ESE):
*There will be **two** groups of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of five questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type seven** questions of ten marks each, out of which any five are to be answered.*

Note: There may be subdivisions in each question asked in Theory Examinations
The Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Class Attendance Score (CAS) of 5 marks and (c) Class Performance Score (CPS) of 5 marks.

Attendance Upto75%, 1 mark; >75 to <=80, 2 marks; >80Attd.<=85, 3 marks; >85Attd.<=90, 4 marks; >90 Attd, 5 marks.

C. **NETWORK SECURITY AND CRYPTOGRAPHY Theory: 45 Lectures; Tutorial: 15 Hours**

Unit-I   Attacks on Computers and Computer Security: Introduction, The Need for Security, Security Approaches, Principles of Security, Types of Attacks.

Unit-II Cryptography: Concepts and Techniques: Introduction, Plain Text and Cipher Text, Substitution Techniques, Transposition Techniques, Encryption and Decryption, Symmetric and Asymmetric Key Cryptography, Steganography, Key range and Key Size, Possible Types of Attacks.

Unit-III Symmetric Key Algorithms and AES: Introduction, Algorithm Types and Modes, An Overview of Symmetric Key Cryptography, Data Encryption Standard (DES), International Data Encryption Algorithm (IDEA), RC4, RC5, Blowfish, Advanced Encryption Standard (AES).

Unit-IV Asymmetric Key Algorithms, Digital Signatures and RSA: Introduction, Brief History of Asymmetric Key Cryptography, An Overview of Asymmetric Key Cryptography, The RSA Algorithm, Symmetric and Asymmetric Key Cryptography Together, Digital Signatures, Knapsack Algorithm, Some Other Algorithms.

Unit-V Digital Certificates and Public Key Infrastructure(PKI): Introduction, DigitalCertificates, Private Key Management, The PKIX Model, Public Key Cryptography Standards (PKCS), XML, PKI and Security, Creating Digital Certificates Using Java.

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Unit-VI Internet Security Protocols: Introduction, Basic Concepts, Secure Socket Layer (SSL), Transport Layer Security (TLS), Secure Hyper Text Transfer Protocol (SHTTP) , Time Stamping Protocol (TSP) , Secure Electronic Transaction (SET), SSL versus SET, 3-D Secure Protocol, Electronic Money, Email Security, Wireless Application Protocol (WAP) Security, Security in GSM, Security in 3G.

Unit-VII User Authentication and Kerberos: Introduction, Authentication Basics, Passwords, Authentication Tokens, Certificate-based Authentication, Kerberos, Key Distribution Center (KDC), Security Handshake Pitfalls, Single Sign on (SSO) Approaches.

Network Security, Firewalls and Virtual Private Networks (VPN): Introduction, Brief Introduction to TCP/IP, Firewalls, IP Security, Virtual Private Networks (VPN), Intrusion.

Text Book:
- o A.Kahate- Cryptography and Network Security, 2nd Edn., Tata McGraw Hill Publication, New Delhi, 2007

Reference Books:
- o B.A. Foronzan – Cryptography & Network Security, TMH, New Delhi, 2007
- o Stalling – Cryptography and Network Security, Pearson Edn., New Delhi, 2006

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OR

PROFESSIONALELECTIVE-I[PRMCA305D]:   (Credits:Theory-04)

Marks: 30 (SIA: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: 3Hrs)=100	Pass Marks (SIA:17 + ESE:28)=45

Instruction to Question Setter for
Mid Semester Examination (MSE):
*There will be **two** groups of questions in written examinations of 20 marks. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type five** questions of five marks each, out of which any three are to be answered.*

End Semester Examination (ESE):
*There will be **two** groups of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of five questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type seven** questions of ten marks each, out of which any five are to be answered.*

Note: There may be subdivisions in each question asked in Theory Examinations
The Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Class Attendance Score (CAS) of 5 marks and (c) Class Performance Score (CPS) of 5 marks.

Attendance Upto75%, 1 mark; >75 to <=80, 2 marks; >80Attd.<=85, 3 marks; >85Attd.<=90, 4 marks; >90 Attd, 5 marks.

NUMERICAL AND STATISTICAL METHODS

Theory: 45 Lectures; Tutorial: 15 Hours
NUMERICAL METHODS

Unit-I: Errors in Numerical calculations: Errors & their computation-absolute, relative & percentage.
Solution of algebraic & transcendental equations: Introduction, Bisection method, Iterative method, False position method, Newton's Raphson method, Lin Bairstows method. Error analysis & convergence study.

Unit-II: Interpolation with equal & unequal intervals: Introduction, finite differences-forward, backward & central, difference tables, differences of polynomials, Newton's formula for interpolation, Gauss's central difference interpolation formula, divided difference & their properties-Newton's divided differences formula, Lagrange's interpolation formula, Inverse interpolation.

Unit-III: Numerical differential & integration: Introduction, derivatives using forward &backward difference formula, Numerical Integration-Trapezoidal rule, Simpson's 1/3 & 3/8 rules Weddle's rule.

Unit-IV: Numerical solution of linear system of equations: Direct method-Gauss elimination, Guass-Jordan, LU decomposition methods. Iterative methods-Gauss-Jacobi & gauss Seidel methods.

Unit-V: Numerical solution ordinary differential equations: Taylor series method, Euler's method, Modified Euler's method, Runga-Kutta methods of 2nd& 4th order, Predictor-corrector methods (Milne's method and Adam's methods).

STATISTICAL METHOD

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Unit-VI: Concept of Probability: Experiment and Sample Space, Events and Operations with Events, Probability of an Event, Basic probability Rules, Application of Probability Rules, Conditional Probability.

Random Variables: How Random Variable Arise, Probability Distribution of a Random Variable, Mean or Expected Value of a Random Variable, Probability Histogram value of a Random Variable, Variance and Standard Deviation of a random Variable.

Unit-VII: Binomial Experiments: Structure of a Binomial Experiment, Binomial Probability Distribution, Use of Binomial Probability Table.

Normal Curve and Normal Distribution: Motivation behind a Normal Curve, properties of a Normal curve, Normal probability Distribution, Areas under a Normal Curve.

Reference:-

☐ Introductory methods of numerical analysis, S.S Sastry (PHI)
☐ An introduction to numerical analysis, Kendall E.Atkinson (Wiley)
☐ Numerical analysis, Dr.B.SGoyel, Dr.S.K.Mittal,(PragatiPrakashan)
☐ Numericals and statistical Techniques, Quazishoebahmed et.al., Ane Books Pvt. Ltd.
☐ Numerical Methods in Engineering & Science (Programs in C, C++ and Introduction to MATLAB) By Dr. B.S. Grewal

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OR

<u>PROFESSIONALELECTIVE - I[PRMCA305E]:</u> (Credits:Theory-04)

Marks: 30 (SIA: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: 3Hrs)=100	Pass Marks (SIA:17 + ESE:28)=45

Instruction to Question Setter for
<u>*Mid Semester Examination (MSE):*</u>
*There will be **two** groups of questions in written examinations of 20 marks. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type five** questions of five marks each, out of which any three are to be answered.*

<u>*End Semester Examination (ESE):*</u>
*There will be **two** groups of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of five questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type seven** questions of ten marks each, out of which any five are to be answered.*

Note: There may be subdivisions in each question asked in Theory Examinations
The Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Class Attendance Score (CAS) of 5 marks and (c) Class Performance Score (CPS) of 5 marks.

Attendance Upto75%, 1 mark; >75 to <=80, 2 marks; >80Attd.<=85, 3 marks; >85Attd.<=90, 4 marks; >90 Attd, 5 marks.

DISTRIBUTED DATABASE ALGORITHM

Theory: 45 Lectures; Tutorial: 15 Hours

Unit– I   Introduction to Distributed Data Processing: Advantages of DDB's, Problem areas.

Unit– II   Distribute Database Management System Architecture: DBMS Standardization, Architectural models for DDBMS Distribute DBMS Architecture.

Unit– III   Distributed Database Design: Design Strategies, Distribution design issues, Fragmentation, Allocation.

Unit– IV   Semantic Data Control : view management, data security, Integrity control.

Unit– V   Query processing and Optimization: Quarry Processing Problem, Characterization of Query Processors, Layers of query Processing, Query decomposition, Query Optimization, Centralized query optimization, Join ordering in fragment queries, Distributed Query Optimization Algorithms.

Unit –VI Transaction Management and Concurrency Control: Introduction, Properties, Serializability Theory, Locking Based Concurrency control Algorithm Time Stamp based concurrency control Algorithms, Dead Lock management.

Unit– VII   Recovery and Reliability: Failures and fault tolerance in distributed system, Distributed & local reliability protocol, Sits failures, network partitioning.

Text Book:
- o   M. Tamer Ozsee,   Patric Valduriez - Principle of Distributed Database Systems 2ndEdn., Pearson Education Asia,2001.
- o   Distributed Database principles & system, Stefano Ceri, Gluseppe Pelagatti(McGrawHill)

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OR

PROFESSIONALELECTIVE - I[PRMCA305F]:   (Credits:Theory-04)

Marks: 30 (SIA: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: 3Hrs)=100	Pass Marks (SIA:17 + ESE:28)=45

Instruction to Question Setter for
Mid Semester Examination (MSE):
*There will be **two** groups of questions in written examinations of 20 marks. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type five** questions of five marks each, out of which any three are to be answered.*

End Semester Examination (ESE):
*There will be **two** groups of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of five questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type seven** questions of ten marks each, out of which any five are to be answered.*

Note: There may be subdivisions in each question asked in Theory Examinations
The Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Class Attendance Score (CAS) of 5 marks and (c) Class Performance Score (CPS) of 5 marks.

Attendance Upto75%, 1 mark; >75 to <=80, 2 marks; >80Attd.<=85, 3 marks; >85Attd.<=90, 4 marks; >90 Attd, 5 marks.

INTERNETOFTHINGS   Theory: 45 Lectures; Tutorial: 15Hours

Unit I: Introduction and Concepts : Definition and Characteristic, Physical Design- Things in IoT, IoT Protocols; Logical Design- IoT Functional Blocks, IoT Communication Models and APIs; IoT Enabling Technologies- Wireless Sensor Networks, Cloud Computing, Big Data Analytics, Communication Protocols, Embedded Systems; IoT Levels & DeploymentTemplates.

Unit II: Introduction to sensors, Transducers, Classification, Roles of sensors in IOT, Various types of sensors, Design of sensors, sensor architecture, special requirements for IOT sensors, Role of actuators, types of actuators.

Unit III: Protocol Standardization for IoT :M2M and WSN Protocols, RFID Protocols & NFC protocols, Issues with IoT Standardization ,Unified Data Standards ,Protocols – IEEE 802.15.4, Zigbee, IPv6 technologies for the IoT, IPv6 over low-power WPAN (6LoWPAN) Hardwire the sensors with different protocols such as HART, MODBUS-Serial & Parallel, Ethernet, BACNet , Current, M2M etc.

Unit IV: IOT Analytics Role of Analytics in IOT, Data visualization Techniques, Introduction to R Programming, Statistical Methods

Unit V: IoT & M2M: Introduction, M2M, Differences between Iot and M2M, SDN (Software Defined Networking) and NFV (Network Function Virtualization) forIot

Unit VI: IoT System Management with NETCONF-YANG: Need for Iot Systems Management, Simple Network Management Protocol (SNMP)- Limitations; Network Operator Requirements, NETCONF, YANG,NETOPEER.

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IoT Platforms Design Methodology: Introduction, IoT Design Methodology, IoT System for Weather Monitoring

Unit VII: IoT Physical Devices & Endpoints: Basic Building Block of IoT Device, Exemplary Device, Arduino Interfaces, Hardware requirement for Arduino, Connecting remotely over the network using VNC, GPIO Basics, Controlling GPIO Outputs Using a Web Interface, – Programming, APIs / Packages, Introduction to Raspberry Pi Interfaces, Beagle bone

InterfacesLinuxonRaspberryPi,RaspberryPiInterfaces-Serial,SPI,I2C;ProgrammingRaspberryPi; with Python- Controlling LED with Raspberry Pi, Interfacing LED & Light Sensor(LDR) and Switch with Raspberry Pi; Other IoT Devices- pc Duino, Beagle Bone Black, Cubie board

Unit VIII Internet of things Challenges: Vulnerabilities of IoT, Security, Privacy & Trust for IoT, Security requirements, Threat analysis, Use cases and misuse cases.

Unit IX : IoT Applications: Introduction, Home Automation- Smart Lighting & Appliances, Intrusion Detection, Smoke/Gas Detectors; Cities- Smart Parking, Smart Lighting & Roads, Structural Health Monitoring, Surveillance, Emergency Response; Environment- Weather Monitoring, Air Pollution Monitoring, Noise Pollution Monitoring, Forest Fire Detection, River Floods Detection; Energy- Smart Grids, Renewable energy Systems,Prognostics;Logistics;

Retail- Inventory Management, Smart Payments, Smart Vending Machines; Logistics- Route Generation & Scheduling, Fleet Tracking, Shipment Monitoring, Remote Vehicle Diagnostics; Agriculture- Smart Irrigation, Green House Control; Industry- Machine Diagnosis & Prognosis, Indoor Air Quality Monitoring; Health & Lifestyle- Health & Fitness Monitoring, Wearable Electronics;

Smart Metering, e-Health Body Area Networks, City Automation, Automotive Applications, Home Automation, Smart Cards, Plant Automation, Real life examples of IOT in Manufacturing Sector

UnitX: IoT Physical Servers and Cloud Offerings: Cloud Storage Models & Communication APIs, WAMP Auto Bahn for IoT, Xively Cloud for IoT, Python Web Application Framework- Django Architecture, Starting Development with Django; Designing a RESTful Wen API, Amazon Web Services for IoT- EC2, Auto Scaling, S3, RDS, Dynamo DB, Kinesis, SQS, EMR; Sky Net IoT MessagingPlatform.

Unit XI : Illustrating IoT Design : Introduction, Home Automation- Smart Lighting, Home Intrusion Detection; Cities- Smart Parking; Environment- Weather Monitoring System, Weather Reporting Bot, Air Pollution Monitoring, Forest Fire Detection; Agriculture- Smart Irrigation; Productivity Application-IotPrinter.

Reference Books:

☐ *ArshdeepBahga& Vijay Madisetti- Internet of Things: A hands-on Approach, 2015, Universitiespress*

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VI. <u>LANGUAGE ELECTIVE - II LAB [EPMCA306A]</u>:   (Credits:Practical-04)

Marks: 30 (SIA: 20 Exp. + 10 Viva) + 70 (ESE Pr: 6Hrs)=100	Pass Marks (SIA:17 + ESE:28)=45

Instruction to Question Setter for
Semester Internal Assessment (SIA):
*There will be **two** questions in Practical Examination of 3Hrs.out of which **any one** is to be answered. The questions in ractical examination will be of equal to 20 marks and will be so framed that the students are able to answer them within the stipulated time. 10 marks will be awarded on the performance in viva voce.*

End Semester Practical Examination (ESE Pr):
*Lab: There will be **four** questions in Practical Examination of 3Hrs.out of which **any two** are to be answered. Student haveto Answer the given questions on Answer booklet and execute the answered programs/steps in computer with standard output. The questions in practical examination will be of equal to 50 marks and will be so framed that the students are able to answer them within the stipulated time. 10 marks will be awarded on the performance in viva voce whereas 10 marks will be awarded on cumulative assessment which is further subdivided as 5 marks for Practical record and 5 marks for Attendance.*

Assignment: The Assignment should be hand written (preferred)/ typed in A4 size paper. First three pages (i.e. front page+ acknowledgment + index) & Bibliography may be printout. <u>No Xerox copy is allowed.</u>

Marks Distribution:

LAB(Experiment + Answer script)   *= 50 marks*
Assignment/ Project + Attendance   *=10 marks*
Viva-voce   *=10 marks*

Note:
Attendance Upto75%, 1 mark; >75 to <=80, 2 marks; >80Attd.<=85, 3 marks; >85Attd.<=90, 4 marks; >90 Attd, 5 marks.

ADVANCE JAVA PROGRAMMING LAB   **Practical: 60 Hours**

1. Programming with the Java Tools Javaap, Jcmd, Jhat, Jdb, Jar
2. Java API Components AWT to create Components, Containers- window, frame, dialog, panel.
3. Swing J components Class, Dialog boxes, Panels, Labels, Checkboxes, Menus, Toolbars and Actions, Sliders, Spinners, Progress bars, Scrollbars, List and Combo boxes,
4. Text-entry Components,
5. Colour and File Choosers,
6. Tables and Trees, Printing with 2D API, Java Print Service API.
7. **JDBC Drivers for RDBMS, SQL to Java type Mapping, Use of **java.sql**
8. XML structure, XML example document, Node interface, Document Node Methods, Element Node properties, Text Nodes. Parsing an XML Document with DOM tree, Generating an XML document with DOM, Validating XML Documents using DTD and XML schema, Transforming XML using XSLT.
9. Introduction, Working with URL connections, URL encoders and decoders.
10. Application Packaging, Servlets, The Servlet API, The User Experience, Building a Web App with Continuity, Framework for Building Web Applications, Building Robust Web Apps.

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11. Developing a simple Bean, create a source file for the new Bean, Create an instance of the colour Bean, Bean interfaces, Message Driven Beans, EJB-Based Application.

Reference Books:

- Wigglesworth & McMillan – Java TM Programming Advanced Topics, 3rdEdn., India Edition, Thomson Education, New Delhi, 2007
- Uttam K. Roy- Advanced Java Programming, Oxford University Press, 2015
- Herbert Schildt The Complete Reference Java 2, 4thEdn, TMH.

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OR

<u>LANGUAGE ELECTIVE - II LAB [EPMCA306B]:</u>   (Credits: Practical-04)

Marks: 30 (SIA: 20 Exp. + 10 Viva) + 70 (ESE Pr: 6Hrs)=100	Pass Marks (SIA:17 + ESE:28)=45

Instruction to Question Setter for
<u>*Semester Internal Assessment (SIA)*</u>*:*
There will be ***two*** *questions in Practical Examination of 3Hrs.out of which* ***any one*** *is to be answered. The questions in practical examination will be of equal to 20 marks and will be so framed that the students are able to answer them within the stipulated time. 10 marks will be awarded on the performance in viva voce.*

<u>*End Semester Practical Examination (ESE Pr)*</u>*:*
<u>*Lab*</u>*: There will be* ***four*** *questions in Practical Examination of 3Hrs.out of which* ***any two*** *are to be answered. Student have to Answer the given questions on Answer booklet and execute the answered programs/steps in computer with standard output.*

The questions in practical examination will be of equal to 50 marks and will be so framed that the students are able to answer them within the stipulated time. 10 marks will be awarded on the performance in viva voce whereas 10 marks will be awarded on cumulative assessment which is further subdivided as 5 marks for Practical record and 5 marks for Attendance.

<u>*Assignment*</u>*: The Assignment should be hand written (preferred)/ typed in A4 size paper. First three pages (i.e. front page + acknowledgment + index) & Bibliography may be printout.* <u>*No Xerox copy is allowed.*</u>

<u>*Marks Distribution*</u>*:*
LAB(Experiment +Answerscript)   = 50marks
Assignment/ Project+Attendance   =10marks
Viva-voce   =10marks

Note:
(Attendance Upto75%, 1mark; 75<Attd.<80, 2 marks; 80<Attd.<85, 3 marks; 85<Attd.<90, 4 marks; 90<Attd, 5 marks).

ADVANCE DOT NETPROGRAMMINGLAB   **Practical: 60Hours**

1. Controls, Menus and Context Menus, Dialog, Form Inheritance, Other Misc.Topics.
2. SQL Server 2008, DML & DDL Query. Join, Trigger, Procedure &function
3. Ado.NET API. Connected Layer Connection, Command & DataReader.
4. DisconnectedLayer   Adaptor, Data Set, Table, Row & Column. ODBC, OLEDB, Oracle Client. Connectivity with Oracle, Access, Excel &MySql.

5. Static Web Page, Application Life Cycle, Dynamic Page, Page Life Cycle & Event Method, Html & Server Control ,Server Control Event Life Cycle, State Management, URL Rewriting, Hidden Form Field, View State, Session, Cookies & Application. Global class & Event Method.

6. Data Source, Sql Data Source, Xml Data Source, Site Map Data Source & Object Data Source. Data Control, Data List, Details View, Form View, Grid View, List View&Repeate

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7. Login, Login Name, Login Staus, Login View, Password Recovery, Change Password, Create User Wizard. Ajax Extensions, Script Manager, Update Panel, Update Progress & Timer Globalization & localization. Mail, SMTP,POP3

8. Forms Applications , Building a Simple MVC Application with Visual Studio , Working with Controllers and Actions, Introduction to Controllers Using a Controller to Manage the Application , Controller Actions , Returning Action Results , Creating MVC Models, Views, Views in ASP.NET MVC, Creating Views, Adding Content to aView

9. Creating a Custom Helper, Using Action Filters, Creating a Custom Filter, Routing andURLs.

10. Using MVC and AJAX and JQuery, Integrating Client-Side Script with MVC , Using the MVC AJAX Helpers Working with JSONData

11. Networking port TCP Client & TCP Listener TCP/IP based networking HTTP based networking Http Request HttpResponse

References:

- Pro ASP.NET MVC5, 5thedition, Adam Freeman, A press publication.
- .NET 4.5 programming (6-in-1) Black Book, Dreamtech Press.

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VII. PRACTICAL'S ON CORE- [CCMCA307]:

Marks: 30 (SIA: 20 Exp. + 10 Viva) + 70 (ESE Pr: 6Hrs)=100	Pass Marks (SIA:17 + ESE:28)=45

Instruction to Question Setter for
Semester Internal Assessment (SIA):
There will be **two** questions in Practical Examination of 3Hrs.out of which **any one** is to be answered. The questions in practical examination will be of equal to 20 marks and will be so framed that the students are able to answer them within the stipulated time. 10 marks will be awarded on the performance in viva voce.

End Semester Practical Examination (ESE Pr):
Lab: There will be **four** questions in Practical Examination of 3Hrs.out of which **any two** are to be answered. Students have to Answer the given questions on Answer booklet and execute the answered programs/steps in computer with standard output.

The questions in practical examination will be of equal to 50 marks and will be so framed that the students are able to answer them within the stipulated time. 10 marks will be awarded on the performance in viva voce whereas 10 marks will be awarded on cumulative assessment which is further subdivided as 5 marks for Practical record and 5 marks for Attendance.

Assignment: The Assignment should be hand written (preferred)/ typed in A4 size paper. First three pages (i.e. front page + acknowledgment + index) & Bibliography may be printout. No Xerox copy is allowed.

Marks Distribution:
LAB(Experiment +Answer script)   = 50marks
Assignment/ Project+Attendance   =10marks
Viva-voce   =10marks

Note:
(Attendance Upto75%, 1mark; 75<Attd.<80, 2 marks; 80<Attd.<85, 3 marks; 85<Attd.<90, 4 marks; 90<Attd, 5 marks)..

PHP, JAVA SCRIPT & JQUERY PROGRAMMING LAB   **Practical: 60 Hours**

Programs to develop to do the following:-

PHP: 1**.** Syntax to declare Variables, Constants, Scope of variables.
2. Expressions, Operators, Conditional statement, Looping constructs, Casting,
3. Dynamic linking.
4. PHP functions, Including and Requiring files, Date and Time functions
5. PHP objects.
6**.** Numerically indexed and Associative arrays, Foreach loop, Array functions.
7. File handling.

MySQL:
1. Data types, Functions,
2. Accessing MySQL via command line,
3. Indexes,
4. Accessing MySQL via php My Admin,

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5. Connecting to MySQL database: Displaying form, Querying database, Table operation-creation, drop.

6. Operations on data- addition, retrieving, updating, deletion;

FORM HANDLING:

1. Building form, retrieving submitted data,

2. Various attributes in HTML5- autocomplete, autofocus, placeholder, required, override, Width and height, form, list, min and max, step;

3. Colour input type, Number and range input types.

COOKIES, SESSIONS AND AUTHENTICATION:

Using Cookies in PHP-
Setting a Cookie, Accessing a Cookie, Destroying a Cookie,
HTTP authentication, --
Storing Usernames and Passwords, alting,
Using sessions—
Starting a Session, Ending a Session, Session Security

EXPLORING JAVASCRIPT:

1. JavaScript and HTML text,
2. Declaring Variables, Operators, Variable typing,
3. Functions, Global variables, Using DOM, Using console.log, Using alert,
4. Writing into elements, Using documents. write,
5. Expressions, Literals, Variables, Operators,
6. The with statement,
7. Exception handling Using on error, Using try…catch,
8. Conditional statements, Looping constructs, Explicit casting, Functions, Objects, Arrays.

JAVASCRIPT AND PHP VALIDATION:

Validating User Input with JavaScript--
The validate.html Document (Part One) , The validate.html Document (Part Two),
Regular Expressions—
Matching Through Meta characters, Fuzzy Character Matching, Meta characters,
Grouping Through Parentheses, Character class, Negation, General modifiers,
Redisplaying form after validation.

ACCESSING CSS FROM JAVASCRIPT:

Revisiting the get Element By Id function—
The O Function , The S Function, The C Function,
Accessing CSS properties from JavaScript---
Some Common Properties, other Properties
Inline JavaScript—
Some Common Properties, Attaching Events to Objects in a Script, Attaching to Other
Events,

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Adding new element—
Removing Elements,
Alternatives to Adding and Removing Elements
Using interrupts—
Using set Timeout, Canceling a Timeout, Using set Interval, Using Interrupts for Animation

JQUERY:

JQuery, Syntax, Selectors, Handling events, Event functions and properties, Special effects, Manipulating DOM, Dynamically applying classes, Modifying dimensions, DOM traversal, Using Ajax, Plug-ins.

Reference Books:

- Learning Php,Mysql& Java Script, Robin Nixon, O'reilly

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ABILITY ENHANCEMENT COURSE [PRMCA308]: (Credits: 02)

Total Marks = 50	Pass Marks =23

Guidelines to Examiners for
End Semester Examination (ESE):

Overall project dissertation may be evaluated under the following heads:

- Motivation for the choice of topic
- Project dissertation design
- Methodology and Content depth
- Results and Discussion
- Future Scope & References
- Participation in Field Training Programme
- Application of Research technique in Data collection
- Report Presentation
- Presentation style

- Viva-voce

Distribution of Marks:

Project Report   (Total = 30 marks)

1.   Formulation of Project Design   = 10
2.   Implementation of the Design   = 10
3.   Presentation of Report   = 10

G.D. and Viva Voce Examination   (Total = 20 marks)

1.   Presentation & Viva   = 10
         Marks   given   by   Internal
2.   Supervisor   = 10
         (based on cumulative assessment)

Note: There will be only one internal examination of 50 marks for this paper.

EVALUATION OF MINI PROJECT - I (SRS, DESIGN, IMPLEMENTATION, TESTING):

This paper is meant for realising the basic principle of software engineering and become confident enough to implement principle and techniques of software engineering. Here it is expected from the students that, while studying software engineering in detail and having hands on programming related to software engineering in Semester-II, they are now ready to work on Implementation & Testing part over the topic of their choice.

        Every student will have to do Mini Project by selecting any topic of his choice under the supervision of internal guide/teacher and to present a report for evaluation prior to the End Semester University Examination. The distribution of marks will be as given above:

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Selection of Internal Guide:

The student has to approach to faculty members for his/her consent for internal guide.

Instruction to the guide:

Each faculty member will give consent for internal guide to a maximum no. of candidates as per following condition:

Maximum No. of candidates/Faculty member = Total No. of Students/ Total No. of Faculty members.

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SEMESTER IV   8 Papers

Total (100 x 4 = 400 Marks) + (50 Marks) + (200 Marks) = 650Marks

I. <u>CORE COURSE - I [CCMCA401]:</u>   (Credits:Theory-04)

Marks: 30 (SIA: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: 3Hrs)=100	Pass Marks (SIA:17 + ESE:28)=45

Instruction to Question Setter for
Mid Semester Examination (MSE):
*There will be **two** groups of questions in written examinations of 20 marks. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type five** questions of five marks each, out of which any three are to be answered.*

End Semester Examination (ESE):
*There will be **two** groups of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of five questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type seven** questions of ten marks each, out of which any five are to be answered.*

Note: There may be subdivisions in each question asked in Theory Examinations
The Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Class Attendance Score (CAS) of 5 marks and (c) Class Performance Score (CPS) of 5 marks.

(Attendance Upto75%, 1mark; 75<Attd.<80, 2 marks; 80<Attd.<85, 3 marks; 85<Attd.<90, 4 marks; 90<Attd, 5 marks).

PYTHON PROGRAMMING   **Theory: 45 Lectures; Tutorial: 15 Hours**

Unit I Introduction to Python: The Python Language, The Python Standard Library and Extension Units, Python Implementations, Python Development and Versions, Python Resources.
The Python Language: Lexical Structure, Data types, Variables and Other References, Expression and Operators, Numeric Operations, Sequence Operations, Set Operations, Dictionary Operations, The print Statement, Control Flow Statements, Functions.
Object-Oriented Python: Classes and Instances, Special Methods, Decorators, Meta classes.

Unit II Exceptions: The TRY Statement, Exception Propagation, The Raise Statement, Exception Objects, Custom Exception Classes, Error-Checking Strategies.

Units: Unit Objects, Unit Loading, Packages, The Distribution Utilities (distutils).

Core Built-ins: Built-in types, Built-in Functions, The sys Unit, The copy Unit, The Collections Unit, The Functional Unit, The Bisect Unit, The Heapq Unit, The User Dict Unit, The Optparse Unit, The Itertools Unit.

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Strings and Regular Expressions: Methods of String Objects, The String Unit, String Formatting, The Pprint Unit, The Repr Unit, Unicode, Regular Expressions and the Re Units.

Unit III File and Text Operations: Other chapters that also deal with Files, Organization of this Chapter, File Objects, Auxiliary Unit for File I/O, The String IO and String IO Units, Compressed Files, The OS Unit, File System Operations, Text Input and Output, Richer-Text I/O, Interactive Command Sessions, Internationalization.

Persistence and Databases: Serialization, DBM Unit, Berkeley DB Interfacing, The Python Database API (DBAPI) 2.0

Unit IV Time Operation: The Time Unit, The Date Time Unit, The Pytz Unit, The dateutil Unit, The sched Unit, The calender Unit, Themx. Date Time Unit.
Controlling Execution: Dynamic Execution and the exec Statement, Internal Types, Garbage Collection, Termination Functions, Site and User Customization.

Unit V Thread and Processes: Thread in Python, The thread Unit, The Queue Unit, The Threading Unit, Threaded Program Architecture, Process Environment, Running Other Programs, The map Unit.

Unit VI Numeric Processing: The Math and cMath Unit, The Operator Unit, Random and Pseudorandom numbers, The Decimal Unit, The gmpy Unit.
Array Processing: The Array Unit, Extensions for Numeric Array Computation, The Numeric Package, Array Objects, Universal Functions (ufuncs), Auxiliary Numeric Units.

Reference Books:

☐ 1.Alex Martelli- PYTHON IN A NUTSHELL,2ND Edition, O'REILLY, 2012
☐ 2.Mark Lutz-Python reference,5thedition,O'Reilly

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II. **PROFESSIONALELECTIVE - I[PRMCA402A]:**   (Credits: Theory-04)

Marks: 30 (SIA: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: 3Hrs)=100	Pass Marks (SIA:17 + ESE:28)=45

Instruction to Question Setter for
Mid Semester Examination (MSE):

There will be **two** *groups of questions in written examinations of 20 marks.* **Group A is compulsory** *and will contain five questions of* **very short answer type** *consisting of 1 mark each.* **Group B will contain descriptive type five** *questions of five marks each, out of which any three are to be answered.*

End Semester Examination (ESE):

There will be **two** *groups of questions.* **Group A is compulsory** *and will contain two questions.* **Question No.1 will be very short answer type** *consisting of five questions of 1 mark each.* **Question No.2 will be short answer type** *of 5 marks.* **Group B will contain descriptive type seven** *questions of ten marks each, out of which any five are to be answered.*

Note: There may be subdivisions in each question asked in Theory Examinations
The Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Class Attendance Score (CAS) of 5 marks and (c) Class Performance Score (CPS) of 5 marks.

(Attendance Upto75%, 1mark; 75<Attd.<80, 2 marks; 80<Attd.<85, 3 marks; 85<Attd.<90, 4 marks; 90<Attd, 5 marks).

PATTERN RECOGNITION   **Theory: 45 Lectures; Tutorial: 15 Hours**

Unit I: Introduction: Definition, Data Sets For Pattern Recognition, Paradigms

UnitII: Representation: Data Structure for Pattern Recognition, Representation of Clusters, Proximity Measures, Size of Pattern, Abstraction of Data set, Feature Extraction and Selection, Evaluation of Classifiers and Clustering.

Unit III: Nearest Neighbour Based Classifiers: Nearest Neighbour(NN) Algorithm, Variants of NN Algorithm, Use of the NN algorithm for Transaction Databases, Efficient Algorithm, Data Reduction, PrototypeSelection.

Unit IV: Bayes Classifiers: Bayes Theorem, Minimum Error Rate Classifiers, Estimation of Probabilities, Comparison with NNC, Naïve Bayes Classifiers, Bayesian BeliefNetwork.

Unit V   Hidden Markov Models (HMM) & Decision Trees: HMM for Classification, HMM, Classification using HMMs, Decision Tree for Pattern Classification, Construction of Decision Tree, Splitting at the Nodes, Over fitting and Pruning.

Unit VI: Support Vector Machines: Introduction, Linear Discriminant Function, Neural Networks, SVM for Classification.

Combination of Classifiers: Introduction, Methods for Constructing Ensembles of Classifiers, Methods for Combining Classifiers.

Unit VII: Clustering: Importance of Clustering, Hierarchical Algorithms, Partitional Clustering, Clustering Large DataSets.

Reference Books:
- Pattern classification by Richard o. Duda, Peter E.Hart and Dvid
- G. Stork Pattern Recognition and Machine Learning by C.M.
- Bishop
- Pattern recognition by S. Theodoridis and Koutroumbas.

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OR

PROFESSIONAL ELECTIVE - II [PRMCA402B]:   (Credits: Theory-04)

Marks: 30 (SIA: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: 3Hrs)=100	Pass Marks (SIA:17 + ESE:28)=45

Instruction to Question Setter for
Mid Semester Examination (MSE):
*There will be **two** groups of questions in written examinations of 20 marks. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type five** questions of five marks each, out of which any three are to be answered.*

End Semester Examination (ESE):
*There will be **two** groups of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of five questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type seven** questions of ten marks each, out of which any five are to be answered.*

Note: There may be subdivisions in each question asked in Theory Examinations
The Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Class Attendance Score (CAS) of 5 marks and (c) Class Performance Score (CPS) of 5 marks.

Attendance Upto75%, 1 mark; >75 to <=80, 2 marks; >80Attd.<=85, 3 marks; >85Attd.<=90, 4 marks; >90 Attd, 5 marks.

ARTIFICIAL INTELLIGENCE   **Theory: 45 Lectures; Tutorial: 15 Hours**

Unit – I   Introduction and Problem Solving: Various definitions of AI, Introduction to AI applications and AI techniques, Production systems, reasoning- forward and backward chaining.

Unit –II Intelligent Agents: Definition of a rational agent, reflex, model-based, goal-based and utility-based agents, environment .

Unit–III Search and Game Playing: Breadth first search, depth first search, iterative deepening, simulated annealing, genetic algorithm search, heuristic search, hill climbing, Best first search, A* algorithm, AO* algorithm, Minmax & game trees, refining minmax, Alpha-Beta pruning, constraint satisfaction.

Unit–IV Knowledge Representation: First order predicate Logic, resolution, unification, natural deduction system, refutation, logic programming, PROLOG, semantic networks, frame system, value inheritance, conceptual dependency, Ontologies.

Unit – V   Planning: basic   representation for planning, symbolic-centralized vs   reactive-distributed, partial order planning algorithm.

Unit – VI   Uncertainty: different types of uncertainty–degree of belief and degree of truth, conditional probability, probability axioms, probability distributions, and joint probability distributions, Bayes' rule, other approaches to modeling uncertainty such as Dempster-Shafer theory and fuzzy sets/logic.

Unit –VII Learning: Concept of learning, neural network, back propagation learning, application of neural network

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Unit –VII Expert System: Need of expert system, Knowledge acquisition, MYCIN

Reference books:

- o Russel and P.Norvig, Artificial Intelligence: A modern Approach.
- o Elain Rich and Kelvin Knight, Artificial Intelligence.
- o Nils J Nilson, Artificial intelligence: A new Synthesis.

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OR

<u>PROFESSIONALELECTIVE - II [PRMCA402C]:</u>   (Credits: Theory-04)

Marks: 30 (SIA: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: 3Hrs)=100	Pass Marks (SIA:17 + ESE:28)=45

Instruction to Question Setter for
<u>*Mid Semester Examination (MSE):*</u>
*There will be **two** groups of questions in written examinations of 20 marks. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type five** questions of five marks each, out of which any three are to be answered.*

<u>*End Semester Examination (ESE):*</u>
*There will be **two** groups of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of five questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type seven** questions of ten marks each, out of which any five are to be answered.*

Note: There may be subdivisions in each question asked in Theory Examinations
The Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Class Attendance Score (CAS) of 5 marks and (c) Class Performance Score (CPS) of 5 marks.

(Attendance Upto75%, 1mark; 75<Attd.<80, 2 marks; 80<Attd.<85, 3 marks; 85<Attd.<90, 4 marks; 90<Attd, 5 marks).

OPTIMIZATIONTECHNIQUES   **Theory: 45 Lectures; Tutorial: 15Hours**

Unit I: Introduction & Linear Programming Formulation: Operation Research Definition and Decision Making, Scope and Application. Meaning and Definition of LPF, Basic Assumption, Application, Limitation, Linear Programming Model, Formulation of Linear Programming

Unit II: LinearProgramming:

The Graphical Method : Definition, Graph of Linear Inequality, The Graphic Method of Solution of Linear Programming Problems

The Simplex Method : Definition, Fundamental Theorem, General Formulation, Matrix Form, Standard Form, Computational Aspect of Simplex Method, Simplex Method- Minimization Problem, Problems Based on Mixed Constraints, The Breaking in Simplex Method, Special Cases in Simplex Methods.

Unit III Duality and Sensitivity Analysis : Formulation of Dual from Primal, Economic Interpretation of Dual Problem, Sensitivity(Post-Optimality)Analysis.

Unit IV Transportation Problem: Transportation Model, Definition, Transportation Algorithm, Methods for Finding Initial Solution, Test for Optimality, Trans-shipmentProblem

Unit V Assignment Problem: Introduction, Mathematical Model, Solution Methods of Assignment Problem, Cases in Assignment Problems, Travelling Salesman Problem.

UnitVI   Decision Theory: Introduction, Structure of Decision Making Problem, Optimism Criterian (Maximax/Minimin Criterion), Pessimism Criterion or Wald Criterion, Minimax Regret Criterion, Laplace Criterion, Hurwicz Criterion, Expected Monetary Value, Expected Opportunity Loss, Expected Value of Perfect Information, Decision Trees.

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Game Theory : Game Theory Concept, Pure Strategy Games(With Saddle Point), Mixed Strategy Games(without Saddle Point)

Unit VII Project Management CPM and PERT: Network Analysis Concept, Critical Path Analysis, Programme Evaluation and Review Technique(PERT), Network Crashing(Time-Cost Trade-off), UpdatingNetwork.

NLPP: Introduction, Formulality a NLPP, General NLPP, Constrained Optimization with Equality Constraints and Inequality constraints, Saddle Points. Kuhn – Tucker Conditions with Non Negative Constraints, Quadratic Programming, Wolfe's Modified Simplex Method.

Reference Books:
❑ J.P. Singh, N.P. Singh- Operations Research, Ane's Books Pvt. Ltd.
❑ Kanti Swarup, P.K. Gupta, Man Mohan – "Opeations Reaearch, Sultan Chand & Sons,
❑ New Delhi Ronald L. Rardin "Optimization in Operations Research", pearson
❑ Education, New Delhi.
  S.S. Rao, "Optimization Theory & Application", Wiley Eastern Ltd.

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OR

<u>PROFESSIONALELECTIVE - I [PRMCA402D]:</u>   (Credits: Theory-04)

| Marks: 30 (SIA: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: 3Hrs)=100   Pass Marks (SIA:17 + ESE:28)=45 |

Instruction to Question Setter for
<u>*Mid Semester Examination (MSE):*</u>
*There will be **two** groups of questions in written examinations of 20 marks. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type five** questions of five marks each, out of which any three are to be answered.*

<u>*End Semester Examination (ESE):*</u>
*There will be **two** groups of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of five questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type seven** questions of ten marks each, out of which any five are to be answered.*

Note: There may be subdivisions in each question asked in Theory Examinations
The Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Class Attendance Score (CAS) of 5 marks and (c) Class Performance Score (CPS) of 5 marks.

(Attendance Upto75%, 1mark; 75<Attd.<80, 2 marks; 80<Attd.<85, 3 marks; 85<Attd.<90, 4 marks; 90<Attd, 5 marks).

COMPUTER GRAPHICS   **Theory: 45 Lectures; Tutorial: 15 Hours**

Unit I: Basic raster graphics Algorithms for Drawing 2D primitives: Scan converting Lines, Circles, Elipses, Filling Rectangles, Polygons, Ellipse, Pattern filling, Clipping in Raster world-(Lines, Circles, Elipses, Polygons) , Antialiasing.

Unit II: Graphics hardware and input devices: Hardcopy and display technologies, raster scand isplay systems, the video controller, random scan processor, input devices for operator interaction, image scanners.

Unit III: Input devices, interaction techniques and interaction tasks: interaction hardware, basicinteraction tasks, composite interaction tasks.

Unit IV: Geometrical transformation;2D transformations, homogeneous coordinates and matrix representation of 2D transformation, composition of 2D transformation, the windows-to-view port transformation, efficiency.

Unit V: Matrix representation   of 3D transformation, composition   of 3D transformation, transformation as a change in coordinate system.

Unit VI: Viewing in 3D: Projections, specifying an arbitrary 3D view, examples of 3d viewing, the mathematics of planar geometric projections, implementing planar geometric projection and coordinate systems.

Unit VII: Achromatic and coloured light: Achromatic light chromatic colour, colour models forraster graphics, reproducing colour, using colour in computer graphics.

Unit VIII: Visible-Surface Determination: Functions of Two Variables, Techniques for Efficient Visible-Surface Algorithms, Algorithms for Scan-Line Determination, The z-Buffer Algorithms, List-Priority Algorithms, Area-Subdivision Algorithms, Algorithms for Octress.

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Unit IX: Clipping: 2-D Clipping algorithms- Line clipping algorithms such as Cohen Sutherland line clipping algorithm, Liang Barsky algorithm, Line clipping against non rectangular clip windows; Polygon clipping – Sutherland Hodgeman polygon clipping, Weiler and Atherton polygon clipping, Curve clipping, Text clipping

Text Books
- D.Hearn and M.P.Baker, Computergraphics, Pretice-hall of india 2004
- J.D.Foley,Avann Dam, S.K. Feiner and J.F. Hughes, computer graphics: principals and practices
- D.F.Rogerrs and A.J. Admas, mathematical elements in computer graphics.

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OR

<u>**PROFESSIONALELECTIVE - II [PRMCA402E]:**</u>   (Credits: Theory-04)

Marks: 30 (SIA: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: 3Hrs)=100	Pass Marks (SIA:17 + ESE:28)=45

Instruction to Question Setter for
<u>***Mid Semester Examination (MSE):***</u>

*There will be **two** groups of questions in written examinations of 20 marks. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type five** questions of five marks each, out of which any three are to be answered.*

<u>***End Semester Examination (ESE):***</u>

*There will be **two** groups of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of five questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type seven** questions of ten marks each, out of which any five are to be answered.*

Note: There may be subdivisions in each question asked in Theory Examinations

The Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Class Attendance Score (CAS) of 5 marks and (c) Class Performance Score (CPS) of 5 marks.

(Attendance Upto75%, 1mark; 75<Attd.<80, 2 marks; 80<Attd.<85, 3 marks; 85<Attd.<90, 4 marks; 90<Attd, 5 marks).

MACHINE LEARNING   **Theory: 45 Lectures; Tutorial: 15Hours**

Unit-I   Overview and Introduction to Bayes Decision Theory: Machine intelligence and applications, pattern recognition concepts classification, regression, feature selection, supervised learning class conditional probability distributions, Examples of classifiers bayes optimal classifier and error, learning classification approaches.

Unit-II Linear machines: General and linear discriminants, decision regions, single layer neural network, linear separability, general gradient descent, perceptron learning algorithm, mean square criterion and widrow-Hoff learning algorithm; multi-Layer perceptrons: two-layers universal approximators, backpropagation learning, on-line, off-line error surface, importantparameters.

Unit-III Learning decision trees: Inference model, general domains, symbolic decision trees, consistency, learning trees from training examples entropy, mutual information, ID3 algorithm criterion, C4.5 algorithm continuous test nodes, confidence, pruning, learning with incomplete data .

Unit-IV Instance-based Learning: Nearest neighbor classification, k-nearest neighbor, nearest neighbor error probability.

Unit-V Machine learning concepts and limitations: Learning theory, formal model of the learnable, sample complexity, learning in zero-bayes and realizable case, VC-dimension, fundamental algorithm independent concepts, hypothesis class, target class, inductive bias, occam's razor, empirical risk, limitations of inference machines, approximation and estimation errors,Tradeoff.

Unit-VI Machine learning assessment and Improvement: Statistical model selection, structural risk minimization, bootstrapping, bagging,boosting.

Unit-VII Support Vector Machines: Margin of a classifier, dual perceptron algorithm, learning nonlinear hypotheses with perceptron kernel functions, implicit non-linear feature space, theory, zero-

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Bayes, realizable infinite hypothesis class, finite covering, margin-based bounds on risk, maximal margin classifier.

Reference Books:
- E. Alpaydin, Introduction to Machine Learning, Prentice Hall of India, 2006.
- T. M. Mitchell, Machine Learning, McGraw-Hill, 1997.
- C. M. Bishop, Pattern Recognition and Machine Learning, Springer, 2006.

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OR

PROFESSIONALELECTIVE - II [PRMCA402F]:   (Credits: Theory-04)

Marks: 30 (SIA: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: 3Hrs)=100	Pass Marks (SIA:17 + ESE:28)=45

Instruction to Question Setter for
Mid Semester Examination (MSE):

*There will be **two** groups of questions in written examinations of 20 marks. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type five** questions of five marks each, out of which any three are to be answered.*

End Semester Examination (ESE):

*There will be **two** groups of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of five questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type seven** questions of ten marks each, out of which any five are to be answered.*

Note: There may be subdivisions in each question asked in Theory Examinations

The Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Class Attendance Score (CAS) of 5 marks and (c) Class Performance Score (CPS) of 5 marks.

(Attendance Upto75%, 1mark; 75<Attd.<80, 2 marks; 80<Attd.<85, 3 marks; 85<Attd.<90, 4 marks; 90<Attd, 5 marks).

SOFT COMPUTING

Unit 1: Introduction to Artificial Intelligence:

Role of AI in engineering, AI in daily life, Intelligence and Artificial Intelligence, Different task domains of AI, Programming methods, Limitations of AI Intelligent Agent: Agent, Performance Evaluation, task environment of agent, Agent classification, Agent architecture.

Unit 2: Concepts of Soft Computing:

Hard computing Vs Soft Computing, Soft computing constituents – ANN, Fuzzy Logic, GA Applications of Soft Computing.

Unit 3: Neural Network:

Artificial Neural Network- Introduction, Fundamental Concept, Artificial Neural Network, Brain vs. Computer - Comparison Between Biological Neuron and Artificial Neuron, Basic Models of Artificial Neural Network Supervised Learning Network-Linear Separability, Perceptron Networks, Adaptive Linear Neuron (Adaline), Multiple Adaptive Linear Neurons, Back-Propagation Network. Unsupervised Learning Networks- MaxNet.

Unit 4: Fuzzy Logic:

Introduction to Fuzzy Logic, Classical Sets and Fuzzy Sets: Introduction to Fuzzy Logic, Classical Sets (Crisp Sets),Fuzzy Sets Classical Relations and Fuzzy Relations: Introduction, Cartesian Product of Relation, Classical Relation, Fuzzy Relations Membership Functions: Introduction, Features of the Membership Functions, Fuzzification, Methods of Membership Value Assignments Defuzzification:

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Introduction, Lambda-Cuts for Fuzzy Sets (Alpha-Cuts), Lambda-Cuts for Fuzzy Relations, Defuzzification Method.

Unit 5: Genetic Algorithm:

Genetic Algorithm: Basic concepts, Difference between genetic algorithm and traditional methods, Simple genetic algorithm, Working principle, Procedures of GA, Genetic operators: Reproduction, Mutation, crossover.

Text Book:

3. S. Rajasekharan & G. A. Vijayalakshmi – " Neural Network, Fuzzy Logic And Gentic Algorithm Synthesis And Applications", Prentice Hall Of India PLT, Pai – 2004.

Reference Books:

1. Jyh – Shing R Jang, C. T. Sun, E Mizutani – Neuro Fuzzy And Soft Computing – A Computational Approach To Learning And Machine Intelligence", Prentice Hall Of India – 1997.

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III. PRACTICAL'S ON CORE – [CPMCA403]:   (Credits: Practical-04)

Marks: 30 (SIA: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: 3Hrs)=100	Pass Marks (SIA:17 + ESE:28)=45

Instruction to Question Setter for
Mid Semester Examination (MSE):
*There will be **two** groups of questions in written examinations of 20 marks. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B** will contain descriptive type five questions of five marks each, out of which any three are to be answered.*

End Semester Examination (ESE):
*There will be **two** groups of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of five questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type seven** questions of ten marks each, out of which any five are to be answered.*

Note: There may be subdivisions in each question asked in Theory Examinations
The Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Class Attendance Score (CAS) of 5 marks and (c) Class Performance Score (CPS) of 5 marks.

(Attendance Upto75%, 1mark; 75<Attd.<80, 2 marks; 80<Attd.<85, 3 marks; 85<Attd.<90, 4 marks; 90<Attd, 5 marks).

LAB ON PYTHON PROGRAMMING   **Practical: 60 Hours**

Programming based on the following:-

1. Data types, Variables and Other References, Expression and Operators,
2. Numeric Operations, Sequence Operations, Strings, Tuples, List, Set Operations, Dictionary Operations,
3. The print, Control Flow Statements, while, for, break, continue for, pass try, raise, with
4. Functions, lambda expressions, generators, attributes.
5. Classes and Instances, bound, unbound, overriding, superclass Methods, Decorators, Metaclasses.
6. Try, raise, with exceptions, Exceptions objects, Standard and custom Exception classes.
7. Units, Import, from, import*, statements, Python built-in Units sys, copy, Collections Unit, Functional Unit, Bisect Unit, Heapq Unit, User Dict Unit, Optparse Unit, Itertools Unit.
8. Methods of String Objects, String Unit, String Formatting, Pprint Unit, Repr Unit, Unicode, Regular Expressions and the Re Units.
9. File and Text Operations: Creating aFiles object with open, Auxiliary Unit for File I/O, The String IO and cString IO Units, Text Input and Output, Richer-Text I/O, Interactive Command Sessions, Internationalization.
10. Persistence and Databases**:** marshal, pickle, any dbm Unit, The Python Database API
11. Time Operation**:** time, datetime, pytz, dateutil, sched, calender, mx. Date Time Unit.
12. Controlling Execution**:** exec Statement, co, _code, co_filename, code_object, gc Unit, weakref, proxy, register.
13. Thread and Processes**:** thread, Queue, Threading, map Unit.

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14. Numeric Processing**:** The math and cmath Unit, operator Unit, Random and Pseudorandom numbers, Decimal, gmpy Unit.

15. Array Processing**:** array Unit, extensions for Numeric Array Computation, Numeric Package, Array Objects, Universal Functions (ufuncs), Auxiliary Numeric Units.

Reference Books:

☐ Alex Martelli- PYTHON IN A NUTSHELL,2ND Edition, O'REILLY, 2012

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IV. PRACTICAL'S ON CORE – [CPMCA404]:

(Credits: Practical-04)

Marks: 30 (SIA: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: 3Hrs)=100   **Pass Marks (SIA:17 + ESE:28)=45**

Instruction to Question Setter for
Mid Semester Examination (MSE):
*There will be **two** groups of questions in written examinations of 20 marks. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type five** questions of five marks each, out of which any three are to be answered.*

End Semester Examination (ESE):
*There will be **two** groups of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of five questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type seven** questions of ten marks each, out of which any five are to be answered.*

Note: There may be subdivisions in each question asked in Theory Examinations
The Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Class Attendance Score (CAS) of 5 marks and (c) Class Performance Score (CPS) of 5 marks.

(Attendance Upto75%, 1mark; 75<Attd.<80, 2 marks; 80<Attd.<85, 3 marks; 85<Attd.<90, 4 marks; 90<Attd, 5 marks).

LAB ON COMPUTER GRAPHICS Practical: 60 Hours
Write a programme for the following in (C/C++/ JAVA)

1. For locating point
2. For drawing line
3. Implement Breshnham algorithm for line drawing.
4. Implement dda algorithm for line drawing.
5. Circle drawing.
6. Elipse drawing
7. Parabola drawing.
8. Boundary fill algorithm.
9. Tranformation in 2d
10. Rectangle
11. Bar and 3D Bar
12. Arc

etc.

Reference:
V.K. Pachghare, Comprhensive Computer Graphics, Laxmi Publication.

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V.   PRACTICAL'S ON CORE – [CPMCA405]:

PRE SUBMISSION SEMINAR

This paper is meant for realising all basic and advanced concepts studied so far by providing software enabled solution on the topic or situation or real problem and become confident enough to overcome challenges of Software industries.

Every student will have to do Mini Project by selecting any topic of his choice under the supervision of internal guide/teacher and to present a report for evaluation prior to the End Semester University Examination. The distribution of marks will be as given above:

Selection of Internal Guide:
The student has to approach to faculty members for his/her consent for internal guide.

Instruction to the guide:
Each faculty member will give consent for internal guide to a maximum no. of candidates as per following condition:

Maximum No. of candidates/Faculty member = Total No. of Students/ Total No. of Faculty members.

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VI. PRACTICAL'S ON CORE – [CPMCA406]:

(Credits:08)

Marks : 50(Documentation) + 50 (Design) + 50 (Coding) + 25 Presentation + 25 (Viva) =200

Guidelines to Examiners for
End Semester Examination (ESE):

Overall project dissertation may be evaluated under the following heads:
- *Motivation for the choice of topic*
- *Project dissertation design*
- *Methodology and Content depth*
- *Results and Discussion*
- *Future Scope & References*
- *Participation in Field Training Programme*
- *Application of Research technique in Data collection*
- *Report Presentation*
- *Presentation style*
- *Viva-voce*

FINAL PROJECT AND INTERNSHIP

A. ON JOB TRAINING (OJT):

1. OJT is **ON JOB TRANING**, Student have to do two months industrial Training from IT origination (**Reference letter for OJT of must be issued from Concern Department**). Student has to produce daily report. In this daily report, Attendee sheet, Work culture and working hour list, day by day, must be listed.
2. **Project Dissertation** approved by the Subject Teacher/H.O.D. of the Department/College concerned. The progress of the Project Dissertation shall be monitored by the faculty members at regular intervals.

Academic Credits for training shall be based on following:
A **Power Point presentation** (based on the report) for duration of **10 minutes** should be make. This will be presented in front of examiners. Marks will be awarded on this presentation and documents submitted to the faculty coordinator at the institute.

Students have to submit the following on completion of training to the concern faculty at the college:
1. Synopsis submission
2. Synopsis Approval will be given within a week from the date of submission.
3. Synopsis will be approved by concerned department faculty member.
4. Faculty members will be the internal guide of particular group of Students.
5. Group will present power point presentation in front of panel and submit the project status report within the 15 to 20 days from the date of approval.

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7. Final Project Submission contains Hard copy, Soft copy & leave letter. <u>Project hard copy contains</u>
   a) Front page
   b) Certificate of Authenticity
   c) Certificate of job Training
   d) Declaration
   e) Acknowledgement
   f) Table of content/index
   g) Project guidelines (These points are mandatory)
      (i). Introduction with Company profile.
      (ii). Vision, mission & objective.
      (iii). SWOT Analysis.
      (iv). Chronology of Achievements.
      (v). Topic introduction & discussion.
      (vi). Its relevance & implication in company.
      (vii). Findings.
      (viii). Conclusion
      (ix). Further enhancement (Suggestion).
      (x). Bibliography
      (xi). Reference Website
      (xii). CD (compact Disc)
   h) The file should be Book Binding .One Project Report for office copy and each candidate must have its own copy.
8. Leave Card.

The Training Report will be submitted in the form specified as under:
   a. The typing should be done on both sides of the paper(instead of single side printing)
   b. The font size should be12 with Times New Roman font.
   c. The Training Report may be typed in 1.5 line spacing.
   d. The paper should be A-4size.

Two copies meant for the purpose of evaluation may be bound in paper and submitted to the approved authority.

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DISTRIBUTION OF MARKS FOR EXAMINATIONS AND FORMAT OF QUESTION PAPERS

Distribution of Marks for Mid Semester Evaluation:

Table No. 15: Distribution of marks of Theory Examinations of Mid Semester

Topic	Code	Full Marks	Pass Marks	Time	Group-A (Very short answer type Compulsory Questions) No. of Questions x Marks = F.M.	Group-B (Descriptive Questions) No. of Questions x Marks = F.M.	Total No. of Questions to Set	
							Group A	Group B
Mid Sem*	T30*	30 (20 +5 +5)	15	1 Hr	5 x1 =5	3 (out of 5) x5 =15	05	5

*There shall be 20 marks theory examination for mid sem, 05 marks for attendance/ regular interactions & 05 marks for seminar/ assignment/ term paper given by faculty concerned in classrooms.

Distribution of Marks for End Semester Theory Examinations:

Table No. 16: Marks distribution of Theory Examinations of End Semester

Topic	Code	Full Marks	Pass Marks	Time	Group-A# (Very short answer type Compulsory Questions) No. of Questions x Marks = F.M.	Group-B (Descriptive Questions) No. of Questions x Marks = F.M.	Total No. of Questions to Set	
							Group A#	Group B
End Sem	T50	50	20	3 Hrs	2 x5 =10	2 (out of 3) x20 =40	2	3
	T70	70	28	3 Hrs	Q.No.1 (5x1) + (3x5) =20	5 (out of 7) x10 =50	2	6

 # Question No.1 in Group-A carries very short answer type questions of 1 Mark

Note   :   There may be subdivisions in each question asked in Theory Examinations.

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FORMAT OF QUESTION PAPER FOR MID SEM EXAMINATION

20 MARKS

MidSem No.   ExamYear

Subject/ Code

F.M.: 20   **Time:**1Hr.

General Instructions:

i.   **Group A** carries very short answer type compulsory questions.

ii.   **Answer 3 out of 5** subjective/ descriptive questions given in **Group B**.

iii.   Answer in your own words as far as practicable.

iv.   Answer all sub parts of a question at one place.

v.   Numbers *in right indicate* full marks of the question.

Group – 'A'

1.   ………………………...   [5 x 1 = 5]

     i.   ………………………………

     ii.   ………………………………

     iii.   ………………………………

     iv.   ………………………………

     v.   ………………………………

Group – 'B'

2.   …………………………   [5]

3.   …………………………   [5]

4.   …………………………   [5]

5.   …………………………   [5]

6.   …………………………   [5]

Note: There may be subdivisions in each question asked in Theory Examination

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FORMAT OF QUESTION PAPER FOR MID SEM EXAMINATION

70 MARKS

MidSem No.   ExamYear

Subject/ Code

F.M.: 70   **Pass Marks:** 28   **Time: 3** Hrs.

General Instructions:

i.   **Group A** carries very short answer type compulsory questions.

ii.   **Answer 5 out of 7** subjective/ descriptive questions given in **Group B**.

iii.   Answer in your own words as far as practicable.

iv.   Answer all sub parts of a question at one place.

v.   Numbers *in right indicate* full marks of the question.

Group – 'A'

1. ………………………...   [5 x 1 = 5]

    i.   ………………………………
    ii.   ………………………………
    iii. ………………………………
    iv.   ………………………………
    v.   ………………………………

2. …………………………..   [5 x 3 =15]

Group – 'B'

3. …………………………   [10]
4. …………………………   [10]
5. …………………………   [10]
6. …………………………   [10]
7. …………………………   [10]
8. …………………………   [10]

Note: There may be subdivisions in each question asked in Theory Examination.