

**B.L.D.E.A's V.P.Dr.P.G.HALAKATTI COLLEGE OF ENGINEERING AND
TECHNOLOGY VIJYAPUR 586103**

INDEX FILE QUESTION PAPERS JUN/JULY 2024

M.C.A.

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CBCS SCHEME

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20MCA14

First Semester MCA Degree Examination, June/July 2024 Mathematical Foundation for Computer Applications

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Define with an example:
(i) Union of two sets (ii) Complement of a set (iii) Cardinality of a set (06 Marks)
- b. Among the integers from 1 to 200, find number of integers:
(i) Not divisible by 5 (ii) Divisible by 2 or 5 or 9 (iii) Not divisible by 2 or 5 or 9 (07 Marks)
- c. Find all eigen value and eigen vectors of the matrix $\begin{bmatrix} -19 & 7 \\ -42 & 16 \end{bmatrix}$ (07 Marks)

OR

- 2 a. Let A, B, C be any three sets then prove that:
(i) $A \cup B = \overline{A \cap B}$ (ii) $A \cup (B \cap C) = (A \cup B) \cap C$ (06 Marks)
- b. In a class of 52 students 30 study C++, 28 study pascal, 13 study both languages:
(i) How many study atleast one language?
(ii) How many study none of the languages? (07 Marks)
- c. Define pigeon hole principle. Prove that in a set of 29 persons atleast five must have born on same day of the week. (07 Marks)

Module-2

- 3 a. With truth table, explain (i) Negation (ii) Conjunction (iii) Conditional (06 Marks)
- b. For any three proposition p, q and r , prove that $[(p \rightarrow q) \wedge (q \rightarrow r)] \rightarrow (p \rightarrow r)$ is a tautology. (07 Marks)
- c. Give direct and indirect proof of following statement. For an integer n if n^2 is odd then n is odd. (07 Marks)

OR

- 4 a. Define converse, inverse and contra-positive of logical implication. (06 Marks)
- b. Test the validity of following argument:
If Ravi goes out with friends he will not study.
If Ravi does not study his father becomes angry. His father not angry.
 \therefore Ravi has not gone out with friends. (07 Marks)
- c. Suppose universe contains set of integers. Consider following open statements.
 $p(x): x \leq 3$ $q(x): x + 1$ is odd $r(x): x > 0$
Then find truth values of:
(i) $p(2)$ (ii) $p(0) \rightarrow q(0)$ (iii) $\neg p(3) \vee r(0)$ (iv) $p(4) \vee (q(1) \wedge r(2))$ (07 Marks)

Module-3

- 5 a. If $A = \{1, 3, 5\}$, $B = \{2, 3\}$, $C = \{4, 6\}$ then find:
(i) $A \times B$ (ii) $(A \cup B) \times C$ (iii) $(A \times B) \cup (B \times C)$ (06 Marks)

1 of 3

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8=50, will be treated as malpractice.

- b. Let $A = \{1, 2, 3, 4\}$ and R be a relation on A defined by $xRy \Leftrightarrow x$ divides y then:
 (i) Write R as ordered pairs
 (ii) Draw digraph of R
 (iii) Write in degree and out degree of the digraph. (07 Marks)
- c. Let $A = \{1, 2, 3, 4, 6, 8, 12\}$. Define a partial order R on A defined by xRy if and only if x divides y . Draw Hasse diagram of R . (07 Marks)

OR

- 6 a. Let A, B, C be any three sets. Then prove that:
 (i) $A \times (B \cup C) = (A \times B) \cup (A \times C)$ (ii) $(A \cap B) \times C = (A \times C) \cap (B \times C)$ (06 Marks)
- b. Define reflexive, symmetric and transitive relations with an example to each. (07 Marks)
- c. For any fixed integer $n > 1$, prove that the relation "congruent modulo n " is an equivalence relation on set of all integers z . (07 Marks)

Module-4

- 7 a. A coin is tossed twice and random variable X represents number of heads turning up. Write probability distribution of X . Then find mean variance of X . (06 Marks)
- b. The number of telephone lines busy at an instant is a binomial variate with probability 0.1 that a line is busy out of 10 lines chosen at random find probability that:
 (i) no line is busy
 (ii) all lines busy
 (iii) at least one line is busy (07 Marks)
- c. If x is normally distributed with mean 12 and S.D 4. Then find (i) $p(x \geq 20)$ (ii) $p(x \leq 20)$ (07 Marks)

OR

- 8 a. The probability distribution of X is given by:
- | | | | | | | | |
|------|---|----|----|----|----|-----|-----|
| X | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| P(X) | K | 3K | 5K | 7K | 9K | 11K | 13K |
- Find K , also find $P(x \geq 5)$, $P(3 < x \leq 6)$. (06 Marks)
- b. If x is an exponential variate with mean 4, evaluate:
 (i) $P(0 < x < 1)$ (ii) $P(x > 2)$ (iii) $P(-\infty < x \leq 10)$ (07 Marks)
- c. Find K such that

$$f(x) = \begin{cases} Kx^2 & 0 < x < 3 \\ 0 & \text{otherwise} \end{cases}$$
 is a probability density function. Also find (i) $P(1 < x < 2)$ (ii) $P(x \leq 1)$ (07 Marks)

Module-5

- 9 a. Define: (i) Complement of a graph (ii) Subgraph (iii) Euler path, with an example. (06 Marks)
- b. Define graph isomorphism. Check following graphs are isomorphic:

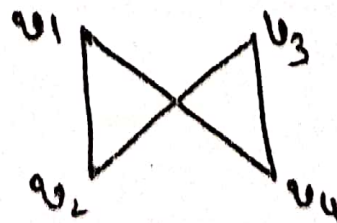
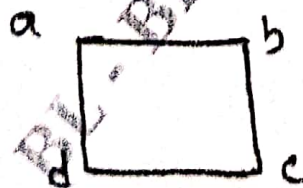


Fig.Q9(b)

(07 Marks)

- c. Find chromatic number of following graph:

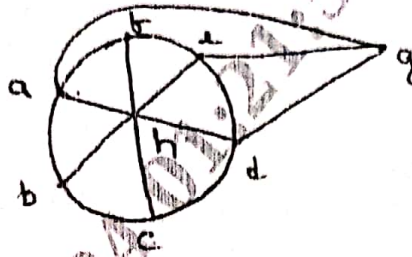


Fig.Q9(c)

(07 Marks)

OR

- 10 a. Define:
- Subgraph
 - Planar graph
 - Chromatic number with an example.
- b. Prove that bipartite graph $K_{3,3}$ is non-planar.
- c. Write a note on Konigsherg bridge problem.

(06 Marks)

(07 Marks)

(07 Marks)

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22MCA32

Third Semester MCA Degree Examination, June/July 2024
Internet of Things

Time: 3 hrs.

Max. Marks: 100

*Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
 2. M : Marks , L: Bloom's level , C: Course outcomes.*

Module - 1			M	L	C
Q.1	a.	What is IoT? What are the evolutionary process of IoT?	10	L1	CO1
	b.	List and explain a few of the most significant challenges and problems that IoT is currently facing.	10	L1	CO1
OR					
Q.2	a.	List and explain the requirements driving specific architectural changes for IoT.	10	L2	CO2
	b.	With a neat diagram, explain the M2M IoT standardized architecture.	10	L2	CO1
Module - 2					
Q.3	a.	Explain the number of ways to group and cluster sensors into different categories.	10	L2	CO2
	b.	How sensors and actuators interact with the physical world? Explain.	10	L1	CO2
OR					
Q.4	a.	Explain design constraints for wireless smart objects.	10	L2	CO2
	b.	Explain the communications criteria in connecting smart objects in IoT.	10	L1	CO2
Module - 3					
Q.5	a.	Illustrate with neat diagram, how to optimize IP for IoT using adaption layer.	10	L2	CO3
	b.	Discuss the various methods used in IoT application transport.	10	L1	CO3
OR					
Q.6	a.	Explain the following with respect to COAP: (i) Message format (ii) COAP reliable transmission	10	L2	CO3
	b.	Explain COAP communication in IoT infrastructures.	10	L2	CO3
Module - 4					
Q.7	a.	List and explain IoT data analytics challenges.	10	L1	CO4
	b.	Explain edge analytics core functions and illustrate edge analytics processing unit.	10	L2	CO4
OR					
Q.8	a.	Discuss the common challenges faced IoT with respect to security.	10	L2	CO4
	b.	Illustrate formal risk analysis structures octave and fair.	10	L2	CO4
Module - 5					
Q.9	a.	With a neat diagram, explain a four layered architecture of a smart city IoT infrastructure.	10	L3	CO5
	b.	Why Arduino? With neat diagram exploring ARDUINO UNO Learning Board.	10	L2	CO5
OR					
Q.10	a.	With neat diagram explain Raspberry Pi and DS18B20 Temperature Sensor.	10	L2	CO5
	b.	List out the IoT strategies for smarter cities.	10	L3	CO5

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22MCA334

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Third Semester MCA Degree Examination, June/July 2024 Object Oriented Modeling and Design

Time: 3 hrs.

Max. Marks: 100

*Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.*

Module – 1			M	L	C
Q.1	a.	Describe the following terms with suitable examples: (i) Enumerations (ii) Multiplicity (iii) Visibility (iv) Association ends	10	L2	CO1
	b.	Define the terms aggregation and composition. Explain each with an example.	10	L2	CO1
OR					
Q.2	a.	What is an event? Explain the several kinds of events with examples.	10	L2	CO1
	b.	Discuss the significance of state diagram and draw the state diagram for telephone line system.	10	L2	CO1
Module – 2					
Q.3	a.	What is a use case? Draw the use case diagram for RMO customer support system and describe the symbols used in use case diagram.	10	L3	CO2
	b.	What is an activity diagram? With neat diagram, describe activity diagram of the telephone order scenario for create new order of RMO customer support system.	10	L3	CO2
OR					
Q.4	a.	Discuss system sequence diagram. Draw the sequence diagram of the web order scenario for create new order use case.	10	L3	CO2
	b.	What is a statechart diagram? List and explain the primary steps for developing a statechart.	10	L3	CO2
Module – 3					
Q.5	a.	Explain well defined stages of software development stages.	10	L2	CO1
	b.	Elaborate and explain the questions to be answered for a good system concept.	10	L2	CO3
OR					
Q.6	a.	List and explain the various criteria to eliminate unnecessary and incorrect classes.	10	L2	CO1
	b.	Describe the various steps to construct a domain state model.	10	L2	CO3
Module – 4					
Q.7	a.	What is a stereotype? Explain different types of standard design classes and the notations used for it with the help of a diagram.	10	L3	CO4
	b.	Explain fundamental design principles for object-oriented design.	10	L3	CO4
OR					
Q.8	a.	Draw and explain complete three-layer sequence diagram for look up item availability use case.	10	L3	CO4
	b.	What is a communication diagram? Explain the symbols used in a communication diagram with the help of a neat diagram.	10	L3	CO4
Module – 5					
Q.9	a.	What is a design pattern? Write the essential elements of pattern in detail.	10	L2	CO5
	b.	Describe the pattern description template in detail.	10	L2	CO5
OR					
Q.10	a.	Explain the singleton design pattern in detail.	10	L2	CO1
	b.	Briefly explain proxy design pattern.	10	L2	CO1

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20MCA342

Third Semester MCA Degree Examination, June/July 2024 Cloud Computing

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. What is Cloud Computing? Briefly discuss on prominent eras of computing. (10 Marks)
b. Illustrate the vision of cloud computing with neat diagram. (10 Marks)

OR

- 2 a. Explain cloud computing reference model with neat diagram. (10 Marks)
b. Describe in detail the core technologies that played an important role in the virtualization of cloud. (10 Marks)

Module-2

- 3 a. Compare Parallel computing Vs distributed computing. (04 Marks)
b. Illustrate the different layers that are involved in providing the services of a distributed system. (08 Marks)
c. Briefly, explain Data-centered category of software architectural styles in Distributed computing. (08 Marks)

OR

- 4 a. What is RPC? Describe RPC reference model with neat diagram. (10 Marks)
b. Write a note on : (10 Marks)
i) Virtual machine architecture
ii) Client/Server architecture

Module-3

- 5 a. Describe the characteristics of virtualization and its reference model with neat sketch. (10 Marks)
b. Explain the machine reference model for execution of virtualization in detail. (10 Marks)

OR

- 6 a. Explain with neat diagram the Type - I and Type - II hypervisors. (10 Marks)
b. Write a note on Microsoft Hyper - V. (10 Marks)

Module-4

- 7 a. Describe the basic components of an IaaS-based solution for cloud computing. (10 Marks)
b. Briefly, explain the community clouds with neat diagram. (10 Marks)

OR

- 8 a. Describe the reference model of Platform-as-a-Shared (PaaS) with diagram. (10 Marks)
b. Explain different challenges posed by cloud computing for industry and academia. (10 Marks)

Module-5

- 9 a. What is Aneka container? Which types of services are hosted inside the Aneka container? Explain in detail. (10 Marks)
b. Describe in detail about the biology applications of cloud computing with respect to protein structure prediction in Jeeva portal. (10 Marks)

OR

- 10 a. Explain Google AppEngine platform architecture with neat diagram. (10 Marks)
b. List and explain productivity applications of cloud computing. (10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
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20MCA41

Fourth Semester MCA Degree Examination, June/July 2024
Advances in Web Technologies

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. What is PHP? Explain major components of PHP with their usability factor? (10 Marks)
 b. What are the different types of pattern matching in PHP? (10 Marks)

OR

- 2 a. What is function and general characteristics of function with example. (10 Marks)
 b. Explain primitives and operations with examples. (10 Marks)

Module-2

- 3 a. What are methods and classes in Ruby? (10 Marks)
 b. Explain various control statements in Ruby. (10 Marks)

OR

- 4 a. Explain the document Request applications in Rail app development. (10 Marks)
 b. Explain the process to connect Database in rail Application with an example. (10 Marks)

Module-3

- 5 a. Explain the mechanism and techniques involved in AJAX. (10 Marks)
 b. Explain with Asynchronous application for creating AJAX application. (10 Marks)

OR

- 6 a. Explain AJAX with its characteristics. (10 Marks)
 b. Describes the Applications of Rich Internet applications with example. (10 Marks)

Module-4

- 7 a. Explain fallback patterns and submission throttling with example. (10 Marks)
 b. Explain two uses of XMLHttpRequest objects. (10 Marks)

OR

- 8 a. Explain AJAX pattern matching with example. (10 Marks)
 b. Explain Multi-stage download and periodicRefresh with example. (10 Marks)

Module-5

- 9 a. What is Bootstrap? What are the offset columns in Bootstrap? Explain with example. (10 Marks)
 b. Explain what are class loaders in Bootstrap with example. (10 Marks)

OR

- 10 a. What is Responsive Design? Explain with appropriate example. (10 Marks)
 b. What do you mean by the Bootstrap Grid system? (10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
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22MCA414

Fourth Semester MCA Degree Examination, June/July 2024 Software Project Management

Time: 3 hrs.

Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.

2. M : Marks , L: Bloom's level , C: Course outcomes.

Module – 1			M	L	C														
Q.1	a.	What is Project? What are the characteristics of a project?	6	L2	CO1														
	b.	How do you categorize the software products?	4	L2	CO1														
	c.	Explain the different activities covered by software project management.	10	L2	CO1														
OR																			
Q.2	a.	What are the differences between Traditional versus Modern Management practices? Mention few traditional and few modern project management tools.	6	L2	CO1														
	b.	Explain plan and methodologies of software project management with a proper example.	4	L2	CO1														
	c.	Explain project control life cycle with a neat diagram.	10	L2	CO1														
Module – 2																			
Q.3	a.	How do you evaluate individual project? Explain the same.	6	L2	CO1														
	b.	Use 10% discount rate and calculate the NPV for the given project. <table border="1" style="margin: 5px auto; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Year</th> <th style="text-align: center;">Project – Cash flow</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">0</td> <td style="text-align: center;">-100000</td> </tr> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">10000</td> </tr> <tr> <td style="text-align: center;">2</td> <td style="text-align: center;">10000</td> </tr> <tr> <td style="text-align: center;">3</td> <td style="text-align: center;">10000</td> </tr> <tr> <td style="text-align: center;">4</td> <td style="text-align: center;">20000</td> </tr> <tr> <td style="text-align: center;">5</td> <td style="text-align: center;">100000</td> </tr> </tbody> </table>	Year	Project – Cash flow	0	-100000	1	10000	2	10000	3	10000	4	20000	5	100000	4	L2	CO1
	Year	Project – Cash flow																	
0	-100000																		
1	10000																		
2	10000																		
3	10000																		
4	20000																		
5	100000																		
c.	Explain different accounting concepts with an example.	10	L2	CO1															
OR																			
Q.4	a.	How net profit payback period, return on investment, net present value, internal rate of return are used to evaluate cost benefit of a project.	15	L2	CO1														
	b.	How allocation of resources within a program are managed in software project management.	5	L2	CO1														
Module – 3																			
Q.5	a.	Explain how activity planning is carried out with a neat diagram.	7	L3	CO2														

	b.	Explain forward pass with an example.	3	L3	CO2																											
	c.	Explain activity on arrow networks rules and conventions.	10	L3	CO2																											
OR																																
Q.6	a.	Draw CPM network and activity table after forward pass and backward pass. Explain the same.	15	L3	CO2																											
		<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Activity</th> <th style="width: 20%;">Duration (weeks)</th> <th style="width: 30%;">Precedents</th> </tr> </thead> <tbody> <tr> <td>i) Hardware selection</td> <td>6</td> <td></td> </tr> <tr> <td>ii) System hardware</td> <td>4</td> <td></td> </tr> <tr> <td>iii) Install hardware</td> <td>3</td> <td>A</td> </tr> <tr> <td>iv) Data Migration</td> <td>4</td> <td>B</td> </tr> <tr> <td>v) Draft office procedures</td> <td>3</td> <td>B</td> </tr> <tr> <td>vi) Recruit staff</td> <td>10</td> <td></td> </tr> <tr> <td>vii) User training</td> <td>3</td> <td>E, F</td> </tr> <tr> <td>viii) Install and test system</td> <td>2</td> <td>C, D</td> </tr> </tbody> </table>				Activity	Duration (weeks)	Precedents	i) Hardware selection	6		ii) System hardware	4		iii) Install hardware	3	A	iv) Data Migration	4	B	v) Draft office procedures	3	B	vi) Recruit staff	10		vii) User training	3	E, F	viii) Install and test system	2	C, D
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viii) Install and test system	2	C, D																														
b.	What are the different methods to identify the risk? Explain the same.	5	L3	CO2																												
Module - 4																																
Q.7	a.	Explain Red/Amber/Green method for reviewing activities of any project.	7	L2	CO3																											
	b.	Explain cost monitoring chart.	3	L2	CO3																											
	c.	Construct Gantt chart, slip chart and time line chart for any project and explain how these charts help in visualizing the progress of a report.	10	L2	CO3																											
OR																																
Q.8	a.	What is earned value analysis and explain the concept with earned value tracking chart.	10	L2	CO3																											
	b.	Explain simple change control procedures for operational systems.	10	L2	CO3																											
Module - 5																																
Q.9	a.	How do you select a right person for a job? Explain the same.	6	L2	CO4																											
	b.	What models help to motivate the people to work and how?	4	L2	CO4																											
	c.	Explain the Oldham – Hackman Job characteristics models and organization behaviour.	10	L2	CO4																											
OR																																
Q.10	a.	How and why health and safety issues are more prominent in construction and in ICT development.	6	L2	CO4																											
	b.	How recruitment process takes place in a company?	4	L2	CO4																											
	c.	What are the different powers and styles of a leader in a company?	10	L2	CO4																											

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22MCA421

Fourth Semester MCA Degree Examination, June/July 2024 IT Project Management

Time: 3 hrs.

Max. Marks: 100

*Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.*

Module - 1			M	L	C
Q.1	a.	With a neat diagram, explain the activities involved in Software Project Management.	10	L2	CO1
	b.	With a neat diagram, explain Project Control Cycle.	10	L2	CO1
OR					
Q.2	a.	Explain how the Evaluation of individual projects is done.	10	L2	CO1
	b.	How risk evaluation is handled in Software Project Management? Illustrate with example.	10	L2	CO1
Module - 2					
Q.3	a.	Explain Rapid Application development model.	10	L2	CO2
	b.	Explain Extreme Programming principle in detail.	10	L2	CO2
OR					
Q.4	a.	Explain Agile methods and its principles.	10	L2	CO2
	b.	Explain COCOMO -II model with example.	10	L2	CO2
Module - 3					
Q.5	a.	Explain different Data collection and Visualization Techniques.	10	L2	CO3
	b.	What is Contract Management? Explain various types of Contract Management.	10	L2	CO3
OR					
Q.6	a.	Explain Software Configuration Management in detail.	10	L2	CO3
	b.	With a neat diagram, explain Framework for Management and Control.	10	L2	CO3
Module - 4					
Q.7	a.	Explain the objectives of Activity Planning.	10	L2	CO3
	b.	Explain Forward pass and Backward pass in S/W Project Management.	10	L2	CO3
OR					
Q.8	a.	Explain PERT technique with example.	10	L2	CO3
	b.	How Sequencing and Scheduling is done in Project Management.	10	L2	CO3

Module – 5					
Q.9	a.	Explain The Oldham – Hackman Job Characteristic Model:	10	L2	CO3
	b.	Explain various types of Organizational structures:	10	L2	CO3
OR					
Q.10	a.	Explain best methods of Staff Selection.	10	L2	CO3
	b.	Write a short note on Decision Making.	10	L2	CO3
