

IT3EPHC550

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St. Aloysius (Deemed To Be University), Mangaluru

Semester II – P. G. Examination – M.C.A

May/June - 2025

Web Technologies & .NET Framework

Time: 2½ Hours

Max. Marks: 60

Answer any FIVE FULL Questions: ONE FULL question from every section.

SECTION - I

1. a) Explain four different ways of parameter passing with suitable example. (6)
b) Write a short note on the following i) Simple array ii) Multi-dimensional Array iii) Jagged array. (6)
2. a) With a neat block diagram explain the functions of the various building blocks in the architecture of the .NET framework. (6)
b) What is inheritance and abstract class? Explain with suitable example. (6)

SECTION - II

3. a) Explain the state management mechanism with all the available states in asp.net (6)
b) Explain various update models in AJAX ASP.NET. (6)
4. a) What are the various stages in the life cycle of an ASP.NET page? (6)
b) Explain in detail about ASP intrinsic objects and web forms in ASP.NET. (6)

SECTION - III

5. a) Discuss the three different Approaches of Entity Framework. (6)
b) Write down the limitations of LINQ. Explain LINQ to SQL and LINQ to XML working. (6)
6. a) Explain the Architecture of ADO.NET. (6)
b) What is the role of a Data Adapter? Explain select, insert update and delete properties of Data Adapter. (6)

SECTION - IV

7. a) Explain in detail working of web service with a neat diagram. (6)
b) What are the steps for creating an application with ASP.NET scaffolding features? (6)
8. a) What is MVC? Explain the Benefits of using MVC. (6)
b) What is the advantage of razor view engine? Which are the two basic types of transitions available in Razor? (6)

SECTION - V

9. a) With example explain the various JSON files available in ASP.NET Core. (6)
b) Explain with example how to Set up MVC in ASP.NET Core application. (6)
10. a) Differentiate between IActionResult and ActionResult in ASP.NET Core. (6)
b) Explain different types of Routing with example. (6)

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Semester II – P. G. Examination – M.C.A

May/June - 2025

Object Oriented Software Engineering

Max. Marks: 60

Time: 2½ Hours

Answer any FIVE FULL Questions: ONE FULL question from every section.

SECTION - I

1. a) What is UML? What are its goals? What are the advantages of using UML? (6)
b) When implementing a control program for a dishwasher that has less than 10 different washing cycles, what paradigm would you use? Why? (6)
2. a) Explain the following Process models with regard to their features, advantages and disadvantages. (6)
(i) Water fall model (ii) V model (iii) Iterative model
b) How is UML useful from three Software-Engineering Modeling Perspectives such as Analysis, Specification and Implementation (6)

SECTION - II

3. a) Explain functional and non functional requirements (6)
b) What are the rules and regulations to be followed while writing use cases for a set of requirements? (6)
4. a) What are the different models that make up Analysis model? Explain briefly. (6)
b) What is Requirements Elicitation? Briefly explain the Products of requirements elicitation and analysis with a neat diagram (6)

SECTION - III

5. a) Write short notes on a) Subsystems and Classes b) Coupling and Cohesion c) Layers and Partitions (6)
b) Draw a sequence diagram for ATM Money Withdrawal (6)
6. a) Explain Generalization and Specialization wrt Class Diagrams. (6)
b) What are the desirable qualities to identify design goals? Explain (6)

SECTION - IV

7. a) Explain Bug, Error, Fault, Failure. (6)
b) Explain the role of Testing in various phases of SDLC. (6)
8. a) Briefly explain the steps in the development of a Test Plan. (6)
b) Explain System testing. (6)

SECTION - V

9. a) Define Software Metrics. What are its objectives? (6)
b) How is Software Quality Measured? (6)
10. a) What are the functions of SQA groups? Explain (6)
b) Write short notes on (i) Quality costs (ii) Prevention costs (6)

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St. Aloysius (Deemed To Be University), Mangaluru

Semester II – P. G. Examination – M.C.A

May/June - 2025

Mobile Application Development using Android

Time: 2½ Hours

Max. Marks: 60

Answer any FIVE FULL Questions: ONE FULL question from every section.

SECTION - I

1. a) Explain the different types of mobile applications. (6)
b) Write the difference between java virtual machine and Dalvik virtual machine (6)
2. a) How is an android project organized in android studio. Explain the significance of each. (6)
b) Which are the four main components of android application? Explain them. (6)

SECTION - II

3. a) What are resources in android? Explain each resource with an example (6)
b) Explain ArrayAdapter with example (6)
4. a) How to call another activity in android. Explain with simple program. (6)
b) What are fragments? How do you incorporate fragments into an activity? Explain with example. (6)

SECTION - III

5. a) What is Intent? List and Explain different types of Intents (6)
b) Write the simple application program on content provider using contacts (6)
6. a) Explain the life cycle of services with neat diagram. (6)
b) Write the simple application to set an alarm in android (6)

SECTION - IV

7. a) Write an android application to perform create and update operation in sql. (6)
b) What is Cursor? List and Explain the methods of Cursor class (6)
8. a) List the various storages that are provided by android. Explain in detail. (6)
b) What is the use of string.xml and color.xml files in android explain with example (6)

SECTION - V

9. a) write a android application to demonstrate AsyncTask in android (6)
b) Explain MediaPlayer class in detail (6)
10. a) Explain the terms sensors and vibration (6)
b) write an android application to convert speech to text (6)

IT3EPSC571d

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St. Aloysius (Deemed To Be University)

Mangaluru

Semester II – P. G. Examination – MCA

May/June - 2025

Operations Research

Time: 2½ Hours

Max. Marks: 60

Answer any FIVE FULL Questions: ONE FULL question from every section.

SECTION - I

1. a) XYZ factory manufactures 2 articles A & B. To manufacture the article A, a certain machine has to be worked for 1.5 hours and in addition a craftsman has to work for 2 hours. To manufacture the article B, the certain machine has to be worked for 2.5 hours and the craftsman has to work for 1.5 hours. In a week the factory can avail 80 hrs of machine time and 70 hrs of craftsman's time. The profit on article A is Rs. 50 and on article B is Rs. 40. If all articles produced can be sold find how many articles of each kind should be produced to earn maximum profit. Formulate the problem as a LPP. (6)

- b) Solve using Simplex method. (6)

$$\text{Min. } Z = X_1 - 3X_2 + 2X_3$$

Subject to the constraints

$$3X_1 - X_2 + 2X_3 = 7$$

$$-2X_1 + 4X_2 = 12$$

$$-4X_1 + 3X_2 + 8X_3 = 10$$

$$X_1, X_2, X_3 \geq 0.$$

2. a) Explain the following with respect to LPP. (6)

- i. Infeasible solution
- ii. Unbounded solution
- iii. Optimal solution

- b) Solve the following LPP by graphical method (6)

$$\text{Maximize } Z = 10X_1 + 8X_2$$

Subject to constraints

$$2X_1 + X_2 \leq 20$$

$$X_1 + 3X_2 \leq 30$$

$$X_1 - 2X_2 \geq -15$$

$$X_1, X_2 \geq 0$$

Contd...2

SECTION - II

3. a) Solve the following transportation problem to maximize the profit. (6)

		DESTINATION				
		A	B	C	D	
	1	15	18	42	33	23
SOURCE	2	80	42	26	81	44
	3	90	40	66	60	33
	DEMAND	23	31	16	30	

- b) Obtain the initial basic feasible solution by using Vogel's Approximation method and hence obtain the optimal solution, where A, B, C, D & E are factories and X, Y & Z are retail shops. (6)

	A	B	C	D	E	Availability
X	5	8	6	6	3	80
Y	4	7	7	6	6	50
Z	8	4	6	6	3	90
Requirement	40	40	50	40	80	

4. a) Find the initial basic feasible solution to the following transportation problem by VAM method. (6)

	A	B	C	D	Supply
1	4	16	1	16	100
2	18	10	8	12	50
3	6	1	4	13	50
4	10	5	6	12	75
Demand	90	50	80	55	

- b) Explain Modified Distribution method in the context of transportation problem. (6)

SECTION - III

5. a) Five salesmen are to be assigned to five districts. Estimates of sales revenue (in thousands) for each salesman are given as following: (6)

	A	B	C	D	E
1	32	38	40	28	40
2	40	24	28	21	36
3	41	27	33	30	27
4	22	38	41	36	36
5	29	33	40	35	39

Find the assignment pattern that maximizes the sales revenue.

- b) For the matrix shown below find least cost route for the traveling salesman problem: (6)

From city	To city					
	A	B	C	D	E	F
A	---	12	7	6	5	5
B	9	---	13	5	13	10
C	6	13	---	7	10	8
D	4	9	10	---	6	9
E	5	13	7	6	---	4
F	5	11	9	6	5	----

6. a) Explain the assignment problem. Give the mathematical model of it. (6)
- b) A lead draftsman has five drafting tasks to accomplish and five idle draftsman. Each draftsman is estimated to require the following number of hours for each task. (6)

	Tasks					
		A	B	C	D	E
Draftsman	1	60	50	100	85	95
	2	65	45	100	75	90
	3	70	60	110	97	85
	4	70	55	105	90	93
	5	60	40	120	85	97

If each draftsman costs the company Rs. 15.80 per hour including overhead, find the assignment of draftsman to tasks that will result in the minimum total cost. What is the total cost?

SECTION - IV

7. a) Write the steps involved in forward pass and backward pass calculation. (6)
- b) The project activities and constraints are: (6)
- $A < D$; $B < E$; $C < F$; $D, E, F < G$
- Construct the network diagram. Find the minimum completion time of the project.

Task	A	B	C	D	E	F	G
Time in days	2	3	4	6	5	3	7

8. a) A project schedule has the following characteristics. Draw the network diagram and find the critical path. (6)

Activity	1-2	1-3	2-4	3-4	3-5	4-5	4-6	5-6
Time in days	6	5	10	3	4	6	2	9

- b) The following table shows the jobs of a network along with their time estimates. (6)

Activity	1-2	1-3	2-4	2-5	3-5	4-6	5-6
a (weeks)	1	1	2	1	2	2	3
m (weeks)	1	4	2	1	5	5	6
b (weeks)	7	7	8	1	14	8	15

You are required to:

- (i) Draw the project network.
(ii) Calculate the earliest and latest occurrence for each event and the expected project length.

SECTION - V

9. a) Find the sequence that minimizes the total time required to complete the following tasks on three machines in order ABC. A processing time of all jobs (in hours) are given in the following table (6)

Jobs	1	2	3	4	5
Machine A	8	10	6	7	11
Machine B	5	6	2	3	4
Machine C	4	9	8	6	5

Also find the total elapsed time and idle time of each machine.

- b) Discuss the key characteristics of queuing systems in detail. (6)
10. a) There are five jobs, each of which must be processed on the two machines A and B in the order AB. Processing times in hours are given in table below; (6)

Jobs	1	2	3	4	5
Machine A	5	1	9	3	10
Machine B	2	6	7	8	4

Determine a sequence for the five jobs that will minimize the elapsed time

- b) A T.V repairman repair the sets in the order in which they arrive (6)
and expects that the time required to repair a set has an exponentially distributed with mean 30mins. The sets arrive in a Poisson fashion at an average rate of 10/8 hrs a day.

- a. What is the expected idle time / day for the repairman?
b. How many TV sets will be there awaiting for the repair?

St Aloysius (Deemed to be University)
Mangaluru
SEMESTER II-PG EXAMINATION -MCA
APRIL/MAY - 2025
Optimization Techniques

Time : 2½ Hours

Max. Marks : 60

Answer any **FIVE FULL** Questions; **ONE FULL** question from every section:**SECTION - I**

- 1.a. Use the congruential method to generate a sequence of Ten two digit random numbers with $X_0=87$, $a=27$, $c=21$ and $m=100$ & Use the chi-square test with $\alpha = 0.05$ to determine if the hypothesis that the numbers are uniformly distributed on the interval $[0,1]$ can be rejected. (6)
- b. Define Simulation and Explain its Advantages (6)
- 2.a. Generate next 10 random numbers using Additive congruential method $\{x_1, x_2, x_3, x_4, x_5\}$ - $\{45, 42, 18, 70, 32\}$ & $m = 85$ (6)
- b. Name entities, attributes, activities, events, and state variables for the following systems: (6)
- (a) University library (b) Bank

SECTION - II

- 3.a) Patients arrive at a registration desk every 1 to 5 minutes with equal probability. The registration process takes between 2 to 6 minutes with the following probabilities: 0.1, 0.2, 0.3, 0.25, and 0.15. Simulate for 10 patients and determine: (6)
- i) The average time a patient spends in the system
- ii) The idle time of the receptionist
- Random numbers for both IAT and ST: 100, 200, 300, 400, 500, 600, 700, 750, 800, 900
- b) Customers arrive at a food truck randomly between 1 and 5 minutes apart with equal probability. Service time for each customer varies between 2 to 6 minutes, with corresponding probabilities: 0.1, 0.2, 0.3, 0.25, and 0.15. Simulate 10 customers and compute: (6)
- i) Average time spent by a customer in the system
- ii) Total idle time of the food truck staff
- Random Numbers for IAT and ST: 100, 200, 300, 400, 500, 600, 700, 750, 800, 900
- 4.a) Consider a random experiment of tossing a coin. Simulate the experiment 20 times and calculate the expected probability of getting heads or tails (6)
- b) Customers arrive at one chair barber shop at random from 1 to 10 minutes apart with equal probability 0.1. The service times vary from 6 to 10 minutes with probabilities 0.06, 0.19, 0.16, 0.27, 0.32. Analyze the system by simulating the arrival and service times for 10 customers to find the average waiting time, the average service time. Take the random members for IAT and ST from the 10 customers as 100, 200, 300, 400, 500, 600, 700, 750, 800, 900. (6)

SECTION - III

- 5.a) Distinguish between Free float and Independent Float. (6)
- b) A project consists of a series of tasks labelled A, B, H, I with the following constraints, $A < D$, $E < B$, $D < F$; $C < G$; $B < H$; $F, G < I$; The notation $X < Y$ means that the task X must be completed before Y is started. You are required to construct a network using this notation. Also find the minimum time of completion of the project when the time of completion of each task is given as follows: (6)

Task	A	B	C	D	E	F	G	H	I
Time in days	18	8	20	16	24	18	19	4	10

- 6.a) The following table shows the jobs of a network along with their time estimates. The time estimates are in days. (6)

Activity	1-2	1-6	2-3	2-4	3-5	4-5	5-8	6-7	7-8
a	2	2	6	2	5	3	1	3	4
m	6	5	12	5	11	6	4	9	19
b	15	14	30	8	17	15	7	27	28

You are required to:

- (i). Draw the project network.
- (ii) Find the critical path and the project length.

Contd... a

- b) A small maintenance project consists of the following jobs whose precedence relationships are given below (6)

Activity	1-2	1-3	2-3	2-5	3-4	3-6	4-5	4-6	5-6	6-7
Time (Days)	15	15	3	5	8	12	1	14	3	14

Draw an arrow diagram representing the project (ii) Find the total float for each activity (iii) Find the critical path and the total project duration.

SECTION - IV

- 7.a) Solve the following payoff matrix, determine the optimal strategies and the value of the game (6)

$$A \begin{matrix} & B \\ \begin{bmatrix} 6 & -3 \\ -3 & 0 \end{bmatrix} \end{matrix}$$

- b) Write a note on the following (6)

- Two person zero sum game
- Pay off matrix
- Fair and unfair game

- 8.a) Find Solution of game theory problem using graphical method (6)

$$A \begin{matrix} & B \\ \begin{bmatrix} 3 & -3 & 4 \\ -1 & 1 & -3 \end{bmatrix} \end{matrix}$$

- b) Use the dominance property to solve the following game (6)

$$\begin{bmatrix} 4 & 6 & 5 & 10 & 6 \\ 7 & 8 & 5 & 9 & 10 \\ 8 & 9 & 11 & 10 & 9 \\ 6 & 4 & 10 & 6 & 4 \end{bmatrix}$$

SECTION - V

- 9.a) In a public telephone booth, the arrivals are on an average 15 per hour. A call on the average takes 3 minutes. If there are just one phone (Poisson arrivals and exponential service), find the expected number of customer in the booth and the idle time of the booth (6)
- b) Explain in detail Components of a Queuing System (6)
- 10.a) Classify different types of queuing models using Kendall's notation. Give examples for each type (6)
- b) Consider a self-service store with one cashier. Assume Poisson arrival and exponential service times. Suppose 9 customers arrive on an average for every 5 minutes and the cashier can service 10 in 5 minutes. Find the average number of customer in the system and average time a customer spends in the store (6)

St Aloysius (Deemed to be University)
Mangaluru
SEMESTER II- PG EXAMINATION -MCA
APRIL/MAY - 2025
Marketing Analytics

Time : 2½ Hours

Max. Marks : 60

Answer any **FIVE FULL** Questions; **ONE FULL** question from every section:

SECTION - I

- 1.a. List and explain the three main phases of the S-curve in product sales forecasting. (6)
- b. What is the Bass Diffusion Model? Explain in simple terms. (6)
- 2.a. You observed a promotional event today and predict, based on the Copernican Principle, that there's a 95% chance it won't last more than 234 days total. How many days do you estimate the event has already been running? (6)
- b. Briefly explain the Bass Model to Forecast New Product Sales (6)

SECTION - II

- 3.a) What are the major variants of the SCAN*PRO model? Briefly explain the purpose of each. (6)
- b) Define Support, Confidence, and Lift in Market Basket Analysis. Explain the significance of each with a suitable example. (6)
- 4.a) Describe different methods used to forecast sales when only a few data points are available. (6)
- b) Explain the step-by-step process of performing RFM analysis in marketing (6)

SECTION - III

- 5.a) A company ran an online advertising campaign for one month. Here are the results: • Ad spend: \$2,000 • Items sold during the campaign: 300 • Price of each item: \$30 • Percentage of sales from ads: 40% Calculate the revenue from ads and ROAS (Return on Advertising Spend). (6)
- b) Define ROAS. Explain how it is calculated with an example. How does it help in assessing advertising effectiveness? (6)
- 6.a) Describe how the Google AdWords (now Google Ads) auction system works. What are the main factors that determine ad rank and cost-per-click (CPC)? (6)
- b) What are media selection models? Explain any one media selection model. (6)

SECTION - IV

- 7.a) Define MDS (Multidimensional Scaling) and Explain its applications in marketing (6)
- b) Explain the applications of ANOVA (6)
- 8.a) Explain the steps in Two-way ANOVA test-with Replication (6)
- b) You have the following dataset of weather conditions and whether people play tennis (6)

Outlook	Temperature	Humidity	Wind	Play Tennis
Sunny	Hot	High	Weak	No
Overcast	Mild	High	Strong	Yes
Rainy	Cool	Normal	Weak	Yes

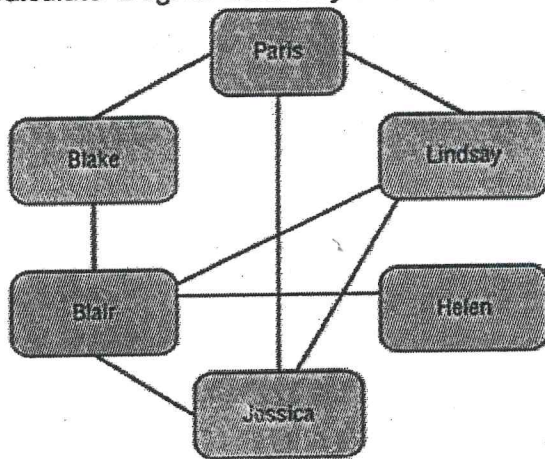
Given the values <Outlook=Sunny, Temperature=Cool, Humidity=High, Wind=Strong>
Use Naïve Bayes to predict Play Tennis (Yes/No)

SECTION - V

- 9.a) Explain Viral Marketing and its mathematical model (6)
- b) Explain Klout score and its importance (6)

Contd... 2

10.a) Calculate Degree Centrality and Closeness Centrality for the following Graph



b) Describe Network contagion Model and Calculate network contagion for the following network, assume $T=0.5$ and node 2 is On

