**Total No. of Questions : 5]**

**SEAT No. :** ____

**PD-2846**

**[Total No. of Pages : 2**

# [6432]-2001
# M.C.A. (Management)
## JPR 551 MJ: Java Programming
## (2024 Pattern) (Semester - II)

***Time : 2½ Hours]*** ***[Max. Marks : 50***

***Instructions to the candidates:***

1) ***All questions are compulsory.***

2) ***Figures to the right indicate full marks.***

**Q1)** Solve any two :

a) Define a class calculation to implement method overloading for addition of two integers and two double variables. **[5]**

b) Define class person with suitable data member and methods. And extend this class in Manager class. Display manager details. **[5]**

c) Write a function using lamboda expression to calculate power of number.$(x^y)$ **[5]**

b) What is garbage collection? Explain with required method. **[5]**

**Q2)** Solve any two :

a) Create a thread to display prime numbers between 1 to 500 each number will display after 3 seconds. **[5]**

b) Write a java program to demonstrate how to create user-defined exception. **[5]**

c) Write a Java program to implement arraylist with function to add, remove & sort member. **[5]**

b) Differentiate between checked and unchecked exception. **[5]**

***P.T.O.***

**Q3)** Solve any one :

a) Create a HTML page to accept two numbers and write servlet to add given numbers and display result. **[10]**

b) Explain servlet life cycle and demonstrate its methods with example. **[10]**

**Q4)** Solve any one :

a) Design Java Application (using JSP) for registration of hackthon (student name, Mail Id, Phone No, Gender, Course) and store data in appropriate table. **[10]**

b) Explain JSP directives with example. **[10]**

**Q5)** Solve any one :

a) Create a spring MVC form to read registration details for Blood donation camp with spring validation & display it. **[10]**

b) Explain spring MVC architecture. And also explain any two spring annotations. **[10]**

Total No. of Questions : 5]

SEAT No. :

**PD-2848**

[Total No. of Pages : 6

# [6432]-2003
# M.C.A. (Management)
# MT - 21 : OPTIMIZATION TECHNIQUES
# (OTE 552 MJ) (2024 Pattern) (Semester - II)

*Time : 2½ Hours]* *[Max. Marks : 50*

***Instructions to the candidates :***

1) ***All questions are compulsory.***
2) ***Use of statistical table and non-programmable calculator is allowed.***
3) ***Figures to right indicate full marks.***

***Q1)*** **A) Solve the following (Any One) :** **[8]**

a) Solve with two phase simplex method

Maximize $Z = 3X_1 + 4X_2$

Subject to $2X_1 + 3X_2 \leq 200$

$5X_1 + 4X_2 \geq 100$

$-8X_1 - 4X_2 \leq -80$

Such that, $X_1, X_2 \geq 0$

b) A company has three plants W, X and Y and three warehouses A, B, C. The supplier is transported from the plants to the warehouses which are located at varying distances from the plants. Due to this, the transportation costs from plants to warehouses vary from Rs.8 to Rs.24 per unit.

The company wishes to minimize the transportation costs. The costs (in Rs.) from the plants to the warehouses are shown in the form of a matrix. Determine the optimum shipping schedule. Use LCM for initial solution.

| | Warehouse | | | |
|---|---|---|---|---|
| Plant | A | B | C | Supply |
| W | 12 | 8 | 18 | 400 |
| X | 20 | 10 | 16 | 350 |
| Y | 24 | 14 | 12 | 300 |
| Demand | 500 | 200 | 300 | |



***P.T.O.***

**B) Explain the following (Any One) :** **[2]**

a) Infeasible Solution

b) Slack and Surplus Variable

***Q2)*** **A) Solve the following (Any One) :** **[5]**

a) There are 7 jobs each of which must go through three machines M1, M2 and M3. The corresponding processing time on the machines in hours are as follows

| Job | **J1** | **J2** | **J3** | **J4** | **J5** | **J6** | **J7** |
|---|---|---|---|---|---|---|---|
| M1 | 3 | 8 | 7 | 4 | 9 | 8 | 7 |
| M2 | 4 | 3 | 2 | 5 | 1 | 4 | 3 |
| M3 | 6 | 7 | 5 | 11 | 5 | 6 | 12 |

i) What is the optimal job sequence that will minimize the total elapsed time?

ii) What is the idle time for each machine (Ml, M2 and M3)?

b) There are seven jobs, each of which has to go through machines A and B in the order BA. Processing time in hours as follows:

Determine an optimum sequence of these jobs that will minimize the total elapsed time

(T). Also find T and calculate idle time for machine A and B

| Job | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| Machine A | 3 | 12 | 15 | 6 | 10 | 11 | 9 |
| Machine B | 8 | 10 | 10 | 6 | 12 | 1 | 3 |

**B) Solve the following (Any One) :** **[5]**

a) The person works in the internet café works for 8 hours a day. The rate of arrival of customers at an internet café follows Poisson distribution with average of fifteen minutes between one customer and the next. The duration of service is assumed to follow exponential distribution with mean of twelve minutes.

i) What is the probability that person arriving at the café will have to wait?

ii) Find the total time for which the person will be idle

b) In a bank with a single cashier, customers arrive on average every 20 minutes and the cashier takes 10 minutes to attend to each customer.

i) What is the average number of customers waiting for the cashier?

ii) What is the average time spent by each customer in the bank?

***Q3)*** **A) Solve the following (Any One) :** **[5]**

a) Three companies introduced new razor blades in the market at the same time, each initially holding an equal market share. After the first year, some changes occurred, which are shown by the following transition matrix:

| | A | B | C |
|---|---|---|---|
| A | 0.9 | 0.03 | 0.07 |
| B | 0.2 | 0.6 | 0.2 |
| C | 0.1 | 0.2 | 0.7 |

Assume no changes in customer buying habits occur. What will be the market share of each company at the end of the first and second year?

b) Two companies, A, B compete against each other. The transition matrix T for people switching each month among them is given by the following transition matrix.

| | | NEXT | |
|---|---|---|---|
| | | A | B |
| INITAIL | A | 65% | 35% |
| | B | 45% | 55% |

Find the long term distribution

**B) Solve the following (Any One) :** **[5]**

a) The daily demand for Coca-Cola bottles, based on past experience, is given as follows:

| Daily Demand | 10 | 20 | 30 | 40 | 50 |
|---|---|---|---|---|---|
| Probability | 0.15 | 0.10 | 0.40 | 0.20 | 0.15 |

A manager decides to keep 25 Coca-Cola bottles in stock. Using the following random numbers: 69, 01, 08, 74, 82, 20, 72, 14, 75, 12,25 estimate the average balance stock.

b) The Lajwaab Bakery shop keeps stock of a popular brand of cake previous experience indicates the daily demand as given below

| Daily Demand | 0 | 15 | 25 | 35 | 45 | 50 |
|---|---|---|---|---|---|---|
| Probability | 0.01 | 0.10 | 0.30 | 0.45 | 0.12 | 0.02 |

Consider the following sequence of random numbers 21, 28, 57, 54, 60, 39, 74, 91, 75, 30. Using this sequence simulate the demand for next 10 days. Find out the stock situation if the owner of the bakery shop decides to make 30 cakes every day.

***Q4)*** **A) Solve the following (Any One) :** **[8]**

a) Consider a CPM network with the following project data:

| Activity | Duration (days) | Predecessor(s) |
|---|---|---|
| A | 4 | None |
| B | 3 | None |
| C | 6 | A |
| D | 2 | B |
| E | 5 | C,D |
| F | 3 | D |
| G | 7 | A,B |
| H | 5 | E,F |

i) Draw a network diagram. Perform Forward Pass and Backward Pass calculations to determine the earliest start (ES), earliest finish (EF), latest start (LS) and latest finish (LF) for each activity.

ii) Calculate the total float and free float for each activity. Identify the activities that are on the critical path.

b) A project consists of 9 activities whose time estimates in weeks & other characteristic are given below

| Activity | Preceding activity | most likely time (Week) | Pessimistic time (Week) | Optimistic time (Week) |
|---|---|---|---|---|
| A | -- | 4 | 6 | 2 |
| B | --- | 6 | 6 | 6 |
| C | -- | 12 | 24 | 6 |
| D | A | 5 | 8 | 2 |
| E | A | 14 | 23 | 11 |
| F | B,D | 10 | 12 | 8 |
| G | B,D | 6 | 9 | 3 |
| H | C,F | 15 | 27 | 9 |
| I | E | 10 | 16 | 4 |

i) Draw the PERT network & find the critical path (Perform Forward Pass and Backward Pass calculations)

ii) find the probability that the project is completed 1 week before the expected time

***Q4)*** **B) Explain the following (Any One) :** **[2]**

a) Difference between PERT and CPM

b) Dummy Activity

***Q5)*** **A) Solve the following (Any One) :** **[5]**

a) The following table gives profit matrix for different strategy and actions. Find the optimal strategy by using EMV Criterion

| States of Nature | Probability | Actions | | |
|---|---|---|---|---|
| | | A1 | A2 | A3 |
| E1 | 0.15 | 40 | 52 | 45 |
| E2 | 0.25 | 70 | 28 | 40 |
| E3 | 0.45 | 30 | 70 | -50 |
| E4 | 0.15 | 30 | -50 | -70 |

b) For a given Cost matrix, suggest optimum strategy using-

| | | Events | | | |
|---|---|---|---|---|---|
| | | N1 | N2 | N3 | N4 |
| Strategies | S1 | 1000 | 1500 | 750 | 0 |
| | S2 | 250 | 2000 | 3750 | 3000 |
| | S3 | -500 | 1250 | 3000 | 4750 |
| | S4 | -1250 | 500 | 2250 | 4000 |

i) Hurwit z Criterion (Alpha = 0.7)

ii) Savage Criterion

***Q5)*** **B) Solve the following (Any One) :** **[5]**

a) Define a zero-sum game and explain the concept of dominance in game theory. Solve the following 2 x 2 zero-sum game using dominance:

| | Strategy 1 | Strategy 2 |
|---|---|---|
| Player 1 | 6 | 4 |
| Player 2 | 5 | 3 |

Identify the dominated strategy (if any) for both players

Simplify the game using the dominance rule and find the optimal strategies for both players.

b) Solve the following to find the value of the game

| | | PLAYER B | | | | |
|---|---|---|---|---|---|---|
| | | B1 | B2 | B3 | B4 | B5 |
| PLAYER A | A1 | 2 | 4 | 3 | 8 | 4 |
| | A2 | 5 | 6 | 3 | 7 | 8 |
| | A3 | 6 | 4 | 9 | 8 | 7 |
| | A4 | 4 | 2 | 8 | 4 | 3 |

**Total No. of Questions : 5]**

**SEAT No. :** [ ]

**PD-2847**

**[Total No. of Pages : 3**

# [6432]-2002
# M.C.A.
# MANAGEMENT
## STQ - 553 MJ : Software Testing and Quality Assurance
## (2024 Pattern) (Semester - II)

***Time : 2½ Hours]*** ***[Max. Marks : 50***

***Instructions to the candidates :***

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Draw daigram wherever necessary.***

***Q1)*** a) Describe software quality assurance and outline its key activities. **[5]**

b) Explain the metrics used to assess and measure reliability. **[5]**

OR

c) Explain the term quality in the context of software engineering and describe product revision factors. **[5]**

d) Describe the significance of ISO 9000 standards in SQA. **[5]**

***Q2)*** a) Outline the steps in software testing life cycle, highlighting the sequence of testing phases. **[5]**

b) Differentiate between fault, defect and failure and describe the common causes of software failure. **[5]**

OR

c) Illustrate the concept of performance testing and detail any three specific performance test categories. **[5]**

d) Discuss the Integration test approaches. **[5]**

***Q3)*** a) In an examination, a candidate must score at least 24 marks to pass, with the maximum possible score being 40 marks.
Using the Equivalence partitioning technique:

i) identify the equivalence partitions for the marks field.

ii) determine the minimun number of test cases required to effectively test the field.

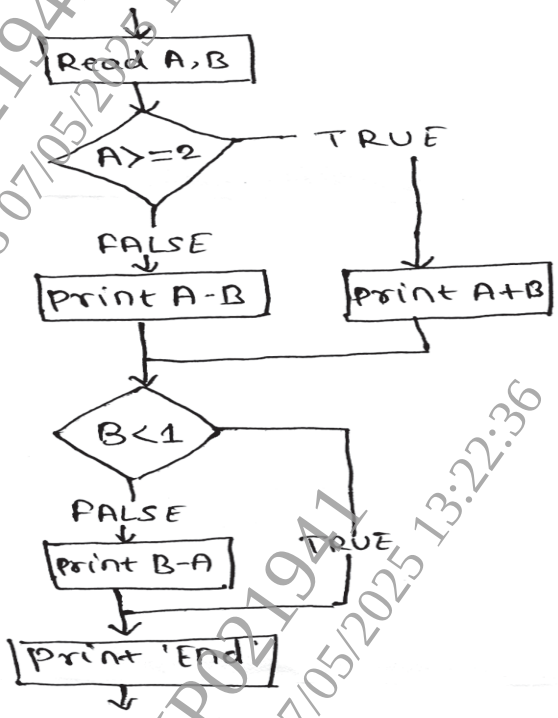
iii) Specify the test cases, including representative values and their expected outcomes. **[5]**

***P.T.O.***

b) Differentiate between static and dynamic testing. **[5]**

OR

c) Given the following flow chart diagram:
What is the minimum number of test cases required for 100% statement coverage and 100% decision coverage? Justify the answer. **[5]**




d) Discuss inspection process in detail. **[5]**

***Q4)*** a) Cloud kitchen aggregator app, smoke & spice lists and promotes cloud kitchens, making them accessible to customers for online food ordering It enables cloud kitchens to manage their menus, orders, and promotions while integrating with third party delivery partners and payment gateways. The app challenges are handling high-order volumes, real time order updates, semless third-party integrations, and secure transactions.

A Write a test plan for the following sections of the IEEE 829 test plan template for the above application. **[10]**

i) scope of testing
ii) objectives
iii) risks
iv) strategy
v) approach

OR

b) Write suitable test case for the above application. **[10]**

***Q5)*** a) Define CAST and explain its benefits in software testing. **[5**

b) Describe the steps in introducing a testing tool into an organization. **[5]**

OR

c) Explain the purpose of postman in API testing. **[5]**

d) Discuss defect life cycle. **[5]**

**Total No. of Questions : 5]**

**SEAT No. :** ____

**PD2857**

**[Total No. of Pages : 2**

# [6432]-2012

## F.Y. M.C.A. (Management)

## RMW 554 MJ - RM21 : RESEARCH METHODOLOGY

## (2024 Pattern) (Semester - II)

***Time : 2½ Hours]*** ***[Max. Marks : 50***

***Instructions to the candidates:***

1) ***Draw neat diagram wherever necessary.***
2) ***All Questions carries equal marks.***
3) ***Scientific calculator is allowed.***

***Q1)*** a) Describe research process with suitable diagram in detail. **[5]**

b) Explain importance of Literature review in research. **[5]**

OR

c) Differentiate qualitative and quantitative research methods with suitable example. **[5]**

d) What is Research Methodology? Explain objectives of research. **[5]**

***Q2)*** a) Elaborate types of research with example. **[10]**

OR

b) What is hypothesis? **[5]**

Prepare a hypothesis (null & alternate) for following situations.

i) Researcher wants to understand the impact of social media usage on children's behaviour.

ii) Researcher wants to understand the lectures attended by first-year students and its effect on final exam scores.

c) What are the key components of a well-structured research design? **[5]**

***Q3)*** a) Explain Probability and Non-probability Sampling methods with suitable examples. **[10]**

OR

b) Suppose you are asked to select a sample for is conducting a survey on students' learning habits. Which sampling method would be most suitable and why? What will be sample size for the same? **[10]**

***P.T.O.***

***Q4)*** a) Discuss Chi - square test. **[10]**

From the following data, find out whether there is any relationship between Gender( Male/Female) & Colour Preferences:

| Colour | Males | Females | Total |
|---|---|---|---|
| Pink | 10 | 40 | 50 |
| Black | 70 | 30 | 100 |
| Yellow | 30 | 20 | 50 |
| Total | 110 | 90 | 200 |

For the above example Formulate null and alternate hypothesis and apply Chi-square test.

(consider : chi - squared value 0.05 significance level at degree of freedom 2 is = 5.99)

OR

b) What is t-test, When it is used? **[10]**

Determine whether the average weight of sample of 20 mangoes is significantly different from population average weight of 70 gms. The sample mean weight is 70.55gms & sample standard deviation is 2.82 gm.

Apply one sample t test for the above example (consider t value at 0.05 significance =2.093).

***Q5)*** a) Select a research topic within a domain of your choice (e.g., Artificial Intelligence, Machine Learning, Cloud Computing, Internet of Things (IOT), Block Chain, Social Media, Cybersecurity, etc. or any topic).

Prepare a research outline which includes a Title, abstract, introduction, literature review, Objectives, Hypothesis, methodology, results & discussion, conclusion, and references. **[10]**

OR

b) Prepare an outline for a research on topic "Impact of Social Media on Indian Youth" with proper title, objectives, hypothesis, Research Gap, Data Collection, sampling, Result and Discussion and Conclusion. **[10]**

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**Total No. of Questions : 5]**

**SEAT No. :**

**PD2851**

**[Total No. of Pages : 3**

# [6432]-2006
# F.Y. M.C.A. (Management)
# MLT 562 MJ : MACHINE LEARNING TECHNIQUES
# (2024 Pattern) (Semester - II)

***Time : 2½ Hours]*** ***[Max. Marks : 50***

***Instructions to the candidates:***

1) ***Scientific calculators are allowed.***
2) ***All questions are compulsory.***
3) ***Assume dataset wherever required.***

***Q1)*** a) Differentiate between supervised and unsupervised learning? **[5]**

b) Explain logistic regression with suitable example. **[5]**

OR

c) Explain the concept of data set, labels and features. **[5]**

d) Explain dimensionality reduction techniques. **[5]**

***Q2)*** a) i) A machine learning model is trained to predict if a person has cancer or not. It is tested on the dataset of 1000 patients. The model predicts 30 patients as having cancer and 970 to be healthy. Out of 30 cancer predictions, 20 are actually having cancer and out of 970 healthy predictions, 965 are actually healthy. Calculate accuracy and F1 - Score. **[5]**

ii) The following data shows the sales (in million dollars) of a company. Estimate the sales in the year 2020 using the regression line? **[5]**

| x | 2015 | 2016 | 2017 | 2018 | 2019 |
|---|---|---|---|---|---|
| y | 12 | 19 | 29 | 37 | 45 |

OR



***P.T.O.***

b) A university wants to predict whether a student will pass or fail a course based on three factors : **[10]**

i) Study Hours (High/low)

ii) Attendance (Good/poor)

iii) Previous Grades (Excellent/Average/Low)

The dataset is as follows:

| Instance | Study Hours | Attendance | Previous Grades | Result |
|---|---|---|---|---|
| 1 | High | Good | Excellent | Pass |
| 2 | Low | Poor | Low | Fail |
| 3 | High | Poor | Average | Pass |
| 4 | Low | Good | Average | Pass |
| 5 | High | Good | Excellent | Pass |
| 6 | Low | Poor | Low | Fail |
| 7 | High | Poor | Low | Fail |
| 8 | Low | Good | Average | Pass |

Constract a decision tree using the CART algorithm to predict the result of statement for the instance {Study Hours : High, Attendance: Poor, Previous Grades : Excellent}

***Q3)*** a) Using the k-means algorithm and Euclidean distance, cluster the following 8 examples into 3 clusters. Consider A1, A4 and A7 as initial seeds (centroids).

A1 = (2, 10), A2 = (2, 5), A3 = (8, 4), A4 = (5, 8), A5 = (7, 5), A6 = (6, 4), A7 = (1, 2), A8 = (4, 9) **[10]**

OR

b) Perform complete linkage agglomerative Hierarchical clustering using the given distance matrix.

Draw the dendrograms for clustering output which should clearly show the order in which the points are merged to form clusters: **[10]**

| Item | A | B | C | D | E |
|---|---|---|---|---|---|
| A | 0 | | | | |
| B | 9 | 0 | | | |
| C | 3 | 7 | 0 | | |
| D | 6 | 5 | 9 | 0 | |
| E | 11 | 10 | 2 | 8 | 0 |

***Q4)*** Solve any two

a) Given the following parameters for
Q - learning problem: **[5]**

-Learning rate $\alpha = 0.2$

- Reward $r_t = 10$

- Current Q-value $Q(s_t, a_t) = 5$

- Next state's Q-value $Q(s_{t+1}, a_{t+1}) = 8$

-Discount factor $r = 0.9$

How would you update the Q-value for state - action pair $(s_t, a_t)$?

b) Explain self - training and co-training techniques in semi - supervised learning. **[5]**

c) Explain Deep Q-Networks (DQN) and compare DQN & Q - learning. **[5]**

***Q5)*** Solve any one.

a) A global bank faced significant financial losses due to credit card fraud. Despite traditional fraud detection methods, fraudulent transactions continued to slip through a machine learning - based fraud detection system to improve real - time fraud detection and reduce false positive.**[10]**

Operations :

i) Develop machine learning model in python for above problem.

ii) Identify independent variables and dependent variables.

iii) Explain the importance of data preprocessing before training the model.

OR

b) A retail company operates multiple stores and wants to predicts daily/ weekly sales for each store based on historial sales data, store characteristics and external influences. **[10]**

Consider the following dataset features : Sales, store ID, Day of the week, date perform following operations.

i) Develop machine learning model in python for above problem.

ii) Identify independent variables and dependent variables.

iii) Explain the importance of data preprocessing before training the model.

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**Total No. of Questions : 5]**

**SEAT No. :** ____

**PD-2855**

**[Total No. of Pages : 2**

# [6432]-2010
# F.Y. M.C.A.
# MANAGEMENT
# PBI 566 MJ : Power BI
# (2024 Pattern) (Semester - II)

***Time : 2½ Hours]*** ***[Max. Marks : 50***

***Instructions to the candidates :***

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right indicate full marks.***
3) ***Assume suitable data, if necessary.***

***Q1)*** **Solve Any Two :**

a) What is Business Intelligence (BI). Explain its key components and benefits. **[5]**

b) What is data modeling? Why is it important in power BI. **[5]**

c) Apply direct query mode in power BI & Compare it with impact mode using real world data set. **[5]**

d) Apply conditional column in power BI to catagorise data based on product data set. **[5]**

***Q2)*** **Solve Any Two :**

a) Analyze the AVARAGE DAX function to calculate the average sales amount per customer. **[5]**

b) Explore the use of slicers and filters in power BI. **[5]**

c) Explore how z-order affects the layering of visuals in power BI and provide an example. **[5]**

d) What is DAX? Explain any four DAX operators. **[5]**

***Q3)*** **Solve Any Two :**

a) Describe any four types of report in power BI with example. **[5]**

b) What are KPI visuals and how are they used in decision making. **[5]**

c) Analyse how the matrix and table present complex data structure in power BI. **[5]**

d) Explore the concept of bookmark & selection pane in power BI. **[5]**

***P.T.O.***

***Q4)*** **Solve Any Two :**

a) Apply M.Query Syntex to write a function that removes duplicate rows from any data set. **[5]**

b) What is pivoting and upivoting in power BI. **[5]**

c) Implement a custom M function that converts all text values in a column to 1. uppercase 2. lowercase. **[5]**

d) How to handle errors in M code using try.... otherwise construct. Provide an example. **[5]**

***Q5)*** **Solve Any One :**

a) A hospital looking to optimize patient care and treatment using power BI analytics. **[10]**

The hospital faces challenges in tracking patient recovery progress, appointment management and efficient use of doctors and beds.

Create a power BI solution for this problem.

i) Write steps/code to connect with hospital DB (e.g. patient records, appointments, doctor schedules).

ii) Write steps/code to clean the data.

iii) Write 2 DAX measure to analyze recovery rate and appointment delays.

iv) Write 2M queries for sorting patients by severity and merging patient & appointment data.

v) Draw a sample power BI dashboard for the same.

b) How did Tata Consultancy Services (TCS) and ICICI Bank benefited from BI implementation. **[10]**