



Q. P. Code: 25888

Time: 3 Hours

Total Marks: 80

Note: 1. Question No. 1 is compulsory

2. Attempt any **three questions** out of remaining five questions.

3. Assume suitable data wherever necessary.

1. (a) Explain Verification in high level and low level design. (05)
- (b) Explain need of Automation in Testing (05)
- (c) Compare Traditional Software Testing and Web based software testing (05)
- (d) Compare progressive and regressive testing (05)
  
2. (a) Explain in detail Software Testing Life Cycle(STLC) (10)
- (b) Explain the difference between failure, fault and error. (10)
  
3. (a) A program reads an integer number within range [1,100] and determines whether it is prime number or not. Design test cases for this program using BVC, robust testing and worst-case testing method. (10)
- (b) Explain issues in Object Oriented Testing. (10)
  
4. (a) Explain entry and exit criteria for Alpha and Beta testing. How Alpha testing is differ from Beta testing. (10)
- (b) Explain need and classification of software matrices. (10)
  
5. (a) Discuss importance of verification and validation in a project. (10)
- (b) Why do we need Integration Testing? Explain its approaches in integration testing. (10)
  
6. Write short note on (any four) (20)
- (a) Acceptance Testing
- (b) Challenges in testing of data ware house
- (c) Regression Testing
- (d) Software quality management
- (e) Efficient Test Suite Management

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QP CODE: 25876

(3 Hours)

[Total Marks: 80



**N.B.**

- i) Question No. 1 is compulsory.
- ii) Solve any three question from five.
- iii) Figure to the right indicates marks.
- iv) Assume suitable data wherever necessary with justification.

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|---|--|----|
| 1 | (a) Define Robot and Robotics  | 05 |
|   | (b) Explain in brief various programming modes of Robots   | 05 |
|   | (c) what are various robot reference frames  | 05 |
|   | (d) Give various definitions used to characterize Robot specifications   | 05 |
| 2 | (a) Explain various Robotic components.  | 10 |
|   | (b) Calculate the joint variables of the robot for which we desire to place the origin of the hand frame of a cylindrical robot at $[3,4,7]^T$ .   | 10 |
| 3 | (a) Consider the following parameters of SCARA robot.<br>$Q = [\pi/6, \pi/3, 120, \pi/4]$<br>$D = (877, 0, 93, 200)$<br>$A = (425, 375, 0, 0)$<br>represent the tool tip position and orientation in the form of Tool Configuration Vector.                                    | 10 |
|   | (b) Explain various types of classification of Robots.   | 10 |
| 4 | (a) The coordinates of point P in mobile frame are given as :<br>$[P]^M = [2, 3, 4]^T$ Initially, both the frames are coincident. A fundamental rotation along the first axis $R_1(\theta)$ is applied with 0 degree. Calculate the coordinates of point P in the fixed frame. | 10 |

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(b) The coordinates of point Q in mobile frame are given as :

$$[Q]^M = [5, 0, 0]^T$$
 Initially, both the frames are coincident.

Then we apply three rotation transformation functions as follows :

- (i)  $R_1(\theta_1) = 90$  degree
- (ii)  $R_2(\theta_2) = -90$  degree
- (iii)  $R_3(\theta_3) = 90$  degree

All the rotations are along the fixed axis. Calculate the coordinates of point Q in the fixed frame.

- 5 (a) The Jacobian of a robot at a particular time is given. Calculate the linear and angular differential motions of the robot's hand frame for the given joint differential motions.

$$J = \begin{bmatrix} 2 & 0 & 0 & 0 & 1 & 0 \\ -1 & 0 & 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 2 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 \end{bmatrix} \quad D\theta = \begin{bmatrix} 0 \\ 0.1 \\ -0.1 \\ 0 \\ 0 \\ 0.2 \end{bmatrix}$$

(b) What is the concept of motion planning in robotics?

- 6 Write short notes on any two

- (a) Bug 1 and bug 2 algorithms.
- (b) Wave-front Planner
- (c) Silhouette methods

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[Time: Three Hours]

[ Marks:80]

- Note: 1. Question number 1 is compulsory. Solve any three out of remaining.  
 2. Draw figure wherever necessary.  
 3. Assume suitable data wherever necessary.

- 1 (a) Consider an application that requires 1TB of storage capacity and performs 4900 IOPS. Application I/O size is 4 kB. As it is business critical application, response time must be within an acceptable range. Specification of available disk drive:  
 Drive capacity = 73 GB; 15,000 rpm; 5 ms average seek time; 40 MB/s transfer rate  
 Calculate the number of disks required? 10
- (b) An application that generates 3600 IOPs with 60% reads and 40% writes. Calculate the IOPS generated for RAID level 1, 4 and 6. Also calculate storage efficiency and usable capacity for RAID levels 3, 5 and 6 with number of disks available are 5 and each disk has storage capacity of 120 GB. 10
- 2 (a) Compare and contrast different RAID levels. 10
- (b) Explain benefits Information Lifecycle Management with respect to the challenges of Information Management. 10
- 3 (a) Explain the components of Intelligent Storage System and its types. 10
- (b) Explain FC ports and login types. 10
- 4 (a) Explain VIA with the help of block diagram. 10
- (b) Explain the architecture and implementation related limitations for efficient storage management. 10
- 5 (a) Explain the storage virtualization challenges. 10
- (b) Explain the components and types of Information System. 10
- 6 Write short notes on: (any four) 20
- Business Impact Analysis(BIA)
  - Zoned Bit Recording
  - Infiniband
  - Document Surrogates
  - Network File System
  - Document Term Matrix

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(3 Hours)

Max. Marks: 80

- N.B.:** (1) Question No. 1 is compulsory.  
 (2) Attempt any **Three** questions out of remaining **Five** questions.  
 (3) **Figures** to the **right** indicate **full** marks.  
 (4) Assume suitable data if necessary.

Q.1 Answer the following:

[20]

- A) Explain the role and effect of damping factor (teleportation) in PageRank computation.  
 B) Agility is a NoSQL business driver. Justify.  
 C) Give the updating buckets approach of DGIM algorithm.  
 D) Find Cosine Distance between the  $d_1$  and  $d_2$  vectors:

index	1	2	3	4	5	6	7	8	9	10
$d_1$	5	2	1	0	0	0	0	1	3	7
$d_2$	5	2	1	0	0	1	2	2	0	2

Q.2 A) List the different NoSQL data stores. Explain any two with diagram. [10]

Q.2 B) Write steps of Girvan-Newman Algorithm. Explain clustering of Social-Network Graphs using GN algorithm with example? [10]

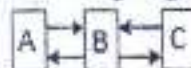
Q.3 A) Explain Flajolet Martin Algorithm with example. [10]

Q.3 B) Distinguish the following: [10]

- DBMS and DSMS
- PCY, Multistage and Multihash

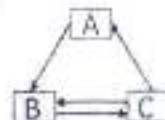


Q.4 A) List Relational-Algebra Operations. Explain any two using MapReduce. [10]

Q.4 B) Compute Efficient PageRank with the damping factor  $d = 0.8$  for web. [10]

Q.5 A) What are different recommender systems. Explain any one with example. [10]

Q.5 B) Define Hub and Authority. Compute Hub and Authority scores for web. [10]



Q.6 Answer the following:

[20]

- Core Hadoop Components
- CURE Algorithm
- SON Algorithm and MapReduce
- Matrix-Vector Multiplication by MapReduce



(3 Hours)

[Total Marks: 80]

N.B.: (1) Question No.1 is Compulsory.

(2) Attempt any three questions from remaining questions.

(3) Assume suitable data wherever required but justify the same.

(4) Figures to the right indicate full marks.

(5) Answer to each new question to be started on a fresh page.

1. (a) Elaborate the steps involved in simulation study. Why is it necessary to have program and process documentation? (10)
- (b) The sequence of numbers 0.63, 0.49, 0.24, 0.89, and 0.71 has been generated. Use the Kolmogorov-Smirnov test with  $\alpha = 0.05$  to determine if the hypothesis that the numbers are uniformly distributed on the interval  $[0, 1]$  can be rejected. (10)  
Use  $D_{0.05, 5} = 0.565$ .

2. (a) A firm sells bulk rolls of newsprint. The daily demand is given by the following probability distribution: (10)

Daily Demand (Rolls)	3	4	5	6
Probability	0.20	0.35	0.30	0.15

Lead time is a random variable given by the following distribution:

Lead Time (Days)	1	2	3
Probability	0.36	0.42	0.22

Determine the lead-time demand for 5 cycles of simulation. Random digits for lead time and demand are as follows:

R.D. for Lead Time	46	75	86	27	63				
R.D. for Demand	4	5	4	5	6	3	4	4	6

- (b) Draw the flowchart for arrival and departure event. Compare event-scheduling, process interaction and activity scanning algorithms. (10)
3. (a) Ace Heating and Air Conditioning service finds that the amount of time a repairman needs to fix a furnace is uniformly distributed between 1.5 and 4 hours. (10)
- (i) Find the probability that a randomly selected furnace repair requires more than 2 hours.
- (ii) Find the probability that a randomly selected furnace repair requires less than 3 hours.
- (iii) Find the mean and standard deviation.
- (b) The number of customers arriving at Costa Coffee is Poisson distributed with mean 4. (10)  
Generate Poisson variate. Use random numbers 0.5389, 0.0532, 0.3492 in sequence.
4. (a) Given the following data for utilization and time spent in system for the Able - Baker carhop problem. Calculate the overall point estimators, standard error and 95% confidence interval for the same. (10)  
Given  $t_{0.025, 3} = 3.18$

Run r	1	2	3	4
Able's Utilization $p_r$	0.808	0.875	0.708	0.842
Average system time $w_r$ (mins)	3.74	4.53	3.84	3.98

- (b) What do you understand by calibration and validation of models? How can one increase the face validity of a model and validate the model assumption? (10)



5. (a) Customers arrive at random to the passport center at a rate of 40 customers per hour. Currently, there are 20 clerks, each serving 4 customers per hour on the average. Estimate the average utilization of a server and the average number of busy servers. Can we decrease the number of servers?
- (b) Describe briefly Queuing, Inventory and Reliability systems.
6. Write short notes on (any two):
- (a) Multivariate and Time Series Input Models
- (b) Areas of applications of simulation
- (c) Initialization bias in steady state simulation
- (d) Simulation of Manufacturing & Material Handling System

