

**2010**

*Time : As in Programme*

*Full Marks : 70*

*The questions are of equal value.*

*Answer all questions.*

1. (a) Differentiate between buffering and spooling.  
(b) Explain how I/O protection is provided by Operating System.

**OR**

Operating System is interrupt-driven. Discuss and justify.

2. (a) Distinguish amongst short-term, long-term and medium-term scheduling.  
(b) Illustrate the execution of processes in the following table using Round-Robin CPU scheduling algorithm, with a time quantum of 2 :

Process	AT	Burst Time
A	0	8
B	1	4
C	2	9
D	3	5
E	4	7

Calculate their TAT and WT.

OR

- (a) What are Cooperating Processes ? Explain through the bounded-buffer problem.
- (b) Illustrate the execution of processes in the table below using SJF CPU scheduling algorithm :

Process	AT	Burst Time
A	0	6
B	1	3
C	3	2
D	6	7
E	7	5

Calculate their TAT and WT.

3. (a) Write and explain the algorithm for two-process solution to critical-section problem.
- (b) Write safety algorithm used in deadlock avoidance. Using the same find the minimum number of resources needed for the following state to be safe :

Process	Current Allocation	Maximum Allocation
A	1	3
B	1	2
C	3	9
D	2	7

OR

- (a) What is system deadlock ? Explain the deadlock prevention mechanism.
- (b) Write the deadlock detection algorithm. Using the same check if deadlock has occurred in the following state :

Process	Allocation			Request		
	R <sub>1</sub>	R <sub>2</sub>	R <sub>3</sub>	R <sub>1</sub>	R <sub>2</sub>	R <sub>3</sub>
A	0	1	0	0	0	0

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1. (a) What is a data model ? Discuss the various types of data models that are in use with their advantages and disadvantages. 10
- (b) What is data independence ? Discuss various forms of data independence with example. 4

**OR**

- (a) Discuss why navigation is simpler in Relational data model than the Hierarchical data model. 7

- (b) Explain the difference between the File-oriented and a Database-oriented system. 7
2. (a) What problems are caused by data redundancies ? Can data redundancies be completely eliminated when database approach is used ? Explain. 7
- (b) Explain why first normal form is acceptable for data processing applications. 7

**OR**

Consider the following relational database :

EMP (E-no, E-name, Skill, Pay-rate )

Position (Posting-No, Skill)

Duty-Allocation (Posting-No, E-no, Shift)

Write relational algebraic expression for the following : 14

- (a) Find the names of employees who are assigned to all positions that require a clerk's skill.
- (b) Find the names and rate of pay of all employees who are not allocated a duty.
- (c) Find the names and skills of the employee who worked in night shift.

3. (a) List all functional dependencies satisfied by the following relation : 10

A	B	C	D
a <sub>1</sub>	b <sub>1</sub>	c <sub>1</sub>	d <sub>1</sub>
a <sub>2</sub>	b <sub>2</sub>	c <sub>2</sub>	d <sub>2</sub>
a <sub>2</sub>	b <sub>3</sub>	c <sub>2</sub>	d <sub>3</sub>
a <sub>3</sub>	b <sub>3</sub>	c <sub>2</sub>	d <sub>4</sub>

- (b) Discuss the various data dependency with example. 4

OR

- (a) Using algorithm clouser find  $A^+$  given that  $F = \{A \rightarrow B, B \rightarrow C, BC \rightarrow D, DA \rightarrow B\}$ . 7
- (b) Given  $R = (A, B, C, D, E)$  and  $F = \{A \rightarrow BC, CD \rightarrow E, B \rightarrow D, E \rightarrow A\}$ , compute  $F^+$ . 7
4. (a) Find a non-redundant cover  $G$  for the set  $F = \{X \rightarrow YZ, ZW \rightarrow P, P \rightarrow Z, W \rightarrow XPQ, XYQ \rightarrow YW, WQ \rightarrow YZ\}$ . 7
- (b) Remove redundant FD's from  $F = \{X \rightarrow Y, Y \rightarrow X, Y \rightarrow Z, Z \rightarrow Y, X \rightarrow Z, Z \rightarrow X\}$  using membership algorithm. 7

OR

- (a) Reduce the set  $F = \{ X \rightarrow YW, XW \rightarrow Z, Z \rightarrow Y, XY \rightarrow Z \}$  by removing left extraneous attribute. 7
- (b) Show that  $F = XY \rightarrow Q$  where  $F = \{ XY \rightarrow W, Y \rightarrow Z, WZ \rightarrow P, WP \rightarrow QR, Q \rightarrow X \}$ . 7
5. Consider  $r(A, B, C, D, E)$  and  $F = \{ AB \rightarrow CE, E \rightarrow AB, C \rightarrow D \}$ : 14
- (a) Determine all possible keys of the relation.
- (b) What is the highest normal form of this relation?
- (c) Put the relation in highest normal form.

OR

- (a) Explain time stamp based protocol. 7
- (b) Explain shadow paging. 7



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1. (a) What is a single chip microprocessor ? With a suitable diagram of a single chip microprocessor, explain each component. 10
- (b) What are the different types of memory used in microprocessor ? 4

**OR**

- (a) Define a microcomputer. Draw a neat and labelled block diagram of a microcomputer and explain each component. 10
- (b) Define and differentiate programmed I/O from Interrupt I/O. 4



2. (a) Explain the register structure of 8085 microprocessor using a suitable diagram. 8
- (b) Explain the addressing modes of 8085 microprocessor with suitable examples. 6

**OR**

- (a) Define a subroutine. Explain the subroutine call with an example. How it differs from macro ? 8
- (b) What do you mean by assembler ? Explain the one pass, two-pass, resident and cross assembler. 6
3. (a) Write an assembly language program for 8085 microprocessor to find the sum of a series of 8-bit numbers and sum is 16-bit. 7
- (b) Write an assembly language program for 808 microprocessor to find the smallest number in a data array which contains 20 numbers.

7

**OR**

- (a) Write an assembly language program for 8085 microprocessor to find decimal addition of two 8-bit numbers and sum is 16-bit. 7
- (b) Write an assembly language program for 8085 microprocessor to perform 8-bit decimal subtraction. 7
4. What is DMA ? How it works in 8085 microprocessor. Define cycle stealing and burst mode of DMA. Write down the advantages as well as disadvantages of DMA. 14

OR

- (a) Explain different types of data transfer schemes in detail ? 10
- (b) Differentiate memory-mapped I/O from I/O mapped I/O. 4
5. (a) Define 8086 Microprocessor ? Draw a neat and labelled 8086 microprocessor architecture diagram. Discuss BIU part in detail. 10

- (b) Explain mode of operation of 8086 microprocessor. 4

**OR**

- (a) Explain the register structure of 8086 microprocessor with a diagram. 7
- (b) Convert an analog voltage of 4.41 volts into its digital form of 7-bits by using reference voltage of 6 volts. 7



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1. (a) Distinguish between the following : 5
- (i) Image Processing and Computer Graphics
  - (ii) Vector Display and Raster Display
- (b) Develop the Mid-point Line algorithm. 9

**OR**

- (c) Explain how colored display is obtained in shadow-mask CRT. 6
- (b) Develop the Cohen-Sutherland line clipping algorithm. 8

2. (a) Given a unit cube with one corner at  $(0,0,0)$  and the opposite corner at  $(1,1,1)$ , derive the transformation required to align the main diagonal {from  $(0,0,0)$  to  $(1,1,1)$ } to the positive z-axis. 8
- (b) Prove that two successive 2D rotations are additive :  $R(\theta_1) \cdot R(\theta_2) = R(\theta_1 + \theta_2)$ . 6

OR

- (c) Derive the 4X4 matrix to represent perspective projection of a point  $P(x, y, z)$  onto the projection plane at  $z = d$ . 5
- (d) Explain with the help of diagrams :
- (i) Isometric Projection 3
  - (ii) Cabinet Projection 3
  - (iii) One-point Perspective Projection 3
3. (a) Obtain an expression for the Hermite curve based on cubic polynomials. 10
- (b) How do the Hermite curves differ from the Bezier Curves ? 4

OR

- (c) Describe how the Lindenmayer's grammar language is used to generate plantlike structures. 8
- (d) Discuss how fractal mountains can be generated basing on recursive subdivision of triangles. 6
4. (a) Explain the following terms : 6
- (i) Wire-frame model
  - (ii) Dynamic image
  - (iii) Stereopsis
- (b) Describe an area subdivision algorithm for determining visible surfaces. 8

OR

- (c) Differentiate between **image-precision** and **object precision** algorithms for visible surface determination. 5
- (d) Describe the z-buffer algorithm for determining visible surfaces. 9
5. (a) Describe the **gamma correction** method for determining the controlgrid voltage in the

CRT to generate the desired intensity for a pixel. 7

- (b) Explain what is meant by Halftone approximation. 7

OR

- (c) Describe the HSV color model. 7

- (d) Differentiate between **Diffuse Reflection** and **Specular Reflection**. Describe the **Phong illumination model** for specular reflection from nonperfect reflectors. 7



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*Answer any **five** questions.*

1. What is Management ? Why it is essential in an Organisation ? Describe the functions of management.
2. Establish the relationship between people, organisation and management in the context of importance of management.
3. What is Organisation Structure ? Why it is required for an organisation ?
4. What do you mean by a matrix structure ? How it is advantageous ?



5. What is Organizational Behaviour ? Describe its importance in the context of management.
6. Organizational Behaviour is a multi disciplinary subject. Describe.
7. What is Perception ? Describe the perceptual process and the factors influencing perception.
8. What is personality ? Describe the determinants of personality. What type of personality you recommend for an organisation ?
9. What do you mean by Motivation ? Describe the Need Hierarchy Theory of Motivation.
10. What is Leadership ? Why it is required for an organisation ? Justify whether today's organisation needs managers or leaders.

