

**2021****COMPUTER APPLICATION****[MAJOR]****Paper : III**

Full Marks : 100

Time : 4 Hours

*The figures in the right-hand margin indicate marks.**Candidates are required to give their answers in their own words as far as practicable.*

1. Answer any **five** questions: 1×5=5
- What is demand paging?
  - What are overlays?
  - What is the purpose of a transpose?
  - What is stack pointer?
  - What is dequeue?
  - What is an ordered list?
  - Define feasible solution.
  - What is successor activity?

2. Answer any **ten** questions from the following: 2×10=20
- State the difference between the shift and rotate instructions?
  - Define the signals HOLD and SID.
  - What do you mean by spooling?
  - What is artificial variable?
  - Define total elapsed time?
  - Deduce trapezoidal rule for Newton-Cote's quadrature formula.
  - What is extended binary tree?
  - Differentiate early and late binding.
  - Enumerate the different RAID levels.
  - What are the primary functions of VFS?
  - What is the function of IO/M signal in 8085?
3. Answer any **five** questions: 6×5=30
- Briefly explain multilevel queue scheduling.
  - What are the functions of program counter, stack pointer and ALE signal?
  - Draw and explain the timing diagram of MOV A, M instruction.
  - Determine EOQ in an inventory control problem having

- i) constant rate of demand
  - ii) instantaneous replenishment and
  - iii) finite rate of production
- e) Using Runge-Kutta method of order 4, find  $y(0.2)$  given that  $dy/dx = 3e^x + 2y$ ,  $y(0) = 0$  taking  $h=0.1$ .
- f) Prove that for any non-empty binary tree  $T$ , if  $n_0$  is the number of leaves and  $n_2$  be the number of nodes having degree 2, then  $n_0 = n_2 + 1$ .
- g) Write the algorithm for in-order traversal of a threaded binary tree.
- h) Convert the following infix expression to corresponding postfix expression:  
 $A + (B * C - (D / E * F) * G) * H$

4. Answer any **three** from the following:  $15 \times 3 = 45$

- a) i) Derive Newton's divided difference formula.
- ii) Find a root of the equation  $x^4 - x - 10 = 0$  that lies between 1 and 2 using Newton-Raphson method correct to 3 decimal places.
- iii) Using Trapezoidal rule compute  $\int_{2/\pi}^{3/\pi} x^2 \cdot \sin(1/x) dx$  by taking seven

ordinates correct to four decimal places.

5+5+5

- b) i) Discuss the steps for data transfer process between a floppy disk and R/W memory of 8085 system using DMA.
  - ii) Write a program to set PC4 and PC7 lines using BSR mode.
  - iii) What are maskable and non-maskable interrupts? 5+7+3
- c) Explain the merge sort algorithm. Why does it run faster than bubble sort in most of the cases? Show how the merge sort algorithm will sort the following array in increasing order: 100,90,80,70,60,50,40,30,20.  
 Analyze the time complexity of the merge sort algorithm. 3+2+5+5
- d) The following table shows the jobs of a network along with their estimates. The time estimates are in days:

Jobs	1-2	1-6	2-9	2-4	3-5	4-5	-8	6-7	7-8
$t_0$	3	2	6	2	5	3	1	3	4
$t_m$	6	5	12	5	11	6	4	9	9
$t_b$	15	14	30	8	17	15	7	27	28

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

iii) Find the probability that the project is completed in 31 days.  $[P(z \leq -2.1667) = 0.0114]$  4+3+8

- e) i) Explain process state and process control block.
- ii) Suppose that the following processes arrive for execution at the time indicated:

Process	Arrival Time	Burst Time	Priority
P0	0	5	2
P1	2	7	4
P2	3	9	1
P3	3	4	5
P4	4	3	3

Draw the Gantt chart. Calculate the average waiting for:

- a) FCFS scheduling algorithm
- b) Priority scheduling algorithm
- c) Preemptive SJF scheduling algorithm
- d) RR scheduling algorithm

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