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B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

September / October 2023 Supplementary Examinations

Programme: B.E. **Semester: V**
Branch: Electronics and Telecommunication Engineering **Duration: 3 hrs.**
Course Code: 19ET5PE2OS **Max Marks: 100**
Course: OPERATING SYSTEMS **Date: 16.09.2023**

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may suitably assumed.

UNIT - I

1 a) Explain batch processing system with diagram **05**

b) Multiprogramming system contains following programs, Prog1: CPU-bound, Prog2: I/O-bound. Use timing chart to analyze the process when I/O bound program has higher priority. If Prog3 of I/O-bound program with intermediate priority is added to above system, identify the influence of additional process Prog3 **05**

c) Explain Time sharing system and derive and expression for response time and efficiency when round – robin scheduling with time slicing is used **05**

d) Explain techniques of distributed operating systems **05**

UNIT - II

2 a) Explain process state and its transitions **05**

b) Explain long term, medium term and short term scheduler **05**

c) Consider the following processes apply SRN. Verify the condition for scheduling these processes. Calculate mean weighted turnaround and mean turnaround time plot the timing chart **05**

Process	P1	P2	P3	P4	P5
Arrival time (sec)	0	0	1	3	5
Service time (sec)	3	6	2	3	1

d) Consider the following processes apply Round robin scheduling with 2ms time slice . Verify the condition for scheduling these processes. Calculate mean weighted turnaround and mean turnaround time plot the timing chart **05**

Process	P1	P2	P3	P4
Arrival time (sec)	0	2	3	9
Service time (sec)	7	4	2	1

OR

3 a) With diagram explain user level thread **05**

b) Consider the following process to explain the HRN policy, calculate response ratio, mean of weighted turn-around time and mean turn-around time. Draw the timing chart **05**

Process	P1	P2	P3	P4	P5
Arrival time (sec)	1	3	4	5	6
Service time (sec)	3	6	4	8	2

c) Consider the following processes to explain Rate Monotonic Scheduling (RMS) and Verify the condition for scheduling these processes. Calculate the Priority of each process and plot the timing chart for one cycles **05**

Process	P1	P2	P3
Time Period (ms)	5	10	15
Service time (ms)	2	3	5

d) Explain three approaches of real time scheduling **05**

UNIT - III

4 a) Explain stack with an example **06**

b) Using following data explain FIFO and LRU page replacement policy, compare both the policy and denote the number of page faults in each of the policies. Consider 3 page frames **08**
Page reference string: 1, 2, 3, 2, 4, 1, 3, 2, 4, 1, 1, 3, 1, 2,
Reference time string: t1, t2, t3, t4, t5, t6, t7, t8, t9, t10, t11, t12,t13,t14

c) Explain paging and Consider process P and R in a system using page size of 1 KB. Process P has the start address 0 and a size of 5500 bytes. Process R has the start address 0 and a size of 2700 bytes Obtain the Effective memory address **06**

(i) Process R logical address is 2248
(ii) Process P logical address is 5228

Page table of process P

Page Number	0	1	2	3	4	5
Page frame #	1	3	9	6	7	8

Page table of process R

Page Number	0	1	2
Page frame #	0	2	5

OR

5 a) Explain the fields of page table and power of two allocator **06**

b) Explain contiguous and non- contiguous memory allocation and obtain the effective memory address of the process P, Logical address space of P extends from 0 to 140Kbytes, while the physical address space extends from 0 to 640Kbytes. Data area *xyz* in the program of process P has the address51488. This is the logical address of *xyz*. Refer figure and also assume the start address of the each free memory area. Obtain Effective memory **06**

address

Memory	Size
FREE	50K
Allocated: C	
FREE	30K
Allocated: D	
FREE	80K
Allocated: E	
FREE	40K

c) For the given page reference string and reference time strings use that Least Recently Used (LRU) page replacement policy to verify whether it exhibits stack property for allocation n= 3 and m=4, Justify the answer with relevant information **08**

Page reference string: 5, 4, 1, 2, 4, 4, 3, 5, 4, 3, 2, 1, 3,

Reference time string: t1, t2, t3, t4, t5, t6, t7, t8, t9, t10, t11, t12,t13

UNIT - IV

6 a) Explain with diagram different approach to deadlock prevention **06**

b) Explain the detail Kernel actions in message passing using symmetric naming and blocking send **06**

c) A system has three processes P1, P2, P3 and 5, 7, 5 resource unit of resource classes R1, R2, R3 respectively. Process P3 makes a request of 1 unit of resource class R1. Check whether the system is in deadlock. Justify answer **08**

	R1	R2	R3
P1	2	1	0
P2	1	3	1
P3	0	1	1
P4	1	2	2

Allocation

	R1	R2	R3
P1	2	1	3
P2	1	4	0
P3	0	0	0
P4	1	0	2

Request

R1	R2	R3
1	0	1

Available

UNIT - V

7 a) Explain sequential and direct access file organization **05**

b) With diagram explain directory structure **05**

c) Explain diagram explain indexed allocation **05**

d) Explain file system action at open system call **05**

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