15IT314J – PRINCIPLES OF OPERATING SYSTEMS
(For the candidates admitted during the academic year 2015 – 2016 onwards)

Note:
(i)   Part - A should be answered in OMR sheet within first 45 minutes and OMR sheet should be handed over to hall invigilator at the end of 45ᵗʰ minute.
(ii) Part - B and Part - C should be answered in answer booklet.

Max. Marks: 100

Time: Three Hours

PART – A (20 × 1 = 20 Marks)
Answer ALL Questions

1. The system which allows only one process to execute at a time is called _____.
   (A) Parallel programming
   (B) Uni programming
   (C) Uni process
   (D) Modular programming

2. The address of the next instruction to be executed by the current process is given by _____.
   (A) Program counter
   (B) Stack
   (C) Memory
   (D) CPU register

3. Process control block does not contain
   (A) Code
   (B) Bootstrap program
   (C) Stack
   (D) Heap

4. In unix, system call to create a new process
   (A) fork ( )
   (B) Create
   (C) New
   (D) Open

5. In multilevel feedback scheduling algorithm
   (A) A process can move to a different classified ready queue
   (B) Classification of ready queue is permanent
   (C) Processes are not classified into groups
   (D) A process cannot move to a different ready queue

6. The link between two processes P and Q to send and receive messages is called _____.
   (A) Communication link
   (B) Message-passing link
   (C) Data link
   (D) Synchronization link

7. A situation where several processes access and manipulate the same data concurrently and the outcome of the execution depends on the particular order in which access takes place is _____.
   (A) Data consistency
   (B) Race condition
   (C) Aging
   (D) Starvation

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8. The time interval from the time of submission of a process to the time of completion is _____.
   - (A) Waiting time
   - (B) Turn around time
   - (C) Response time
   - (D) Throughput

9. The operating system and the other processes are protected from being modified by an already running process because
   - (A) They are in different memory spaces
   - (B) They are in different logical addresses
   - (C) They have a protection algorithm
   - (D) Every address generated by the CPU is checked against the relocation and limit registers

10. A solution to the problem of external fragmentation is _____.
    - (A) Compaction
    - (B) Larger memory space
    - (C) Smaller memory space
    - (D) Paging

11. A locality is
    - (A) A set of pages that are actively used together
    - (B) A space in memory
    - (C) An area near a set of processes
    - (D) A space in hard disk

12. The pager concerns with the _____.
    - (A) Individual page of a process
    - (B) Entire process
    - (C) Entire thread
    - (D) First page of a process

13. In a paged memory systems, if the page is increased, then the internal fragmentation generally:
    - (A) Becomes less
    - (B) Becomes more
    - (C) Remains constant
    - (D) Remains zero

14. _____ is the concept in which a process is copied into main memory from the secondary memory
    - (A) Paging
    - (B) Demand paging
    - (C) Segmentation
    - (D) Swapping

15. Which algorithm chooses the page that has not been used for the longest period of time whenever page required to be replaced?
    - (A) First in first out
    - (B) Least recently used
    - (C) Counting based page replacement
    - (D) Additional reference

16. In paged memory systems, if the page size is increased, then the internal fragmentation
    - (A) Become less
    - (B) Becomes zero
    - (C) Becomes more
    - (D) Remains constant

17. Indexed allocation _____ direct access
    - (A) Supports
    - (B) Does not support
    - (C) Is not related to
    - (D) Related to

18. Each _____ has its own index block
    - (A) Partition
    - (B) Address
    - (C) File
    - (D) Memory

19. On systems where there are multiple operating systems, the decision to load a particular one is done by _____.
   (A) Boot loader
   (B) Boot strap
   (C) Process control block
   (D) File control block

20. A better way of contiguous allocation to extend the file size is
   (A) Adding an extent of contiguous space
   (B) Adding an index table to the first contiguous block
   (C) Adding pointers to the first contiguous block
   (D) Adding a linked list of disk blocks

PART – B (5 × 4 = 20 Marks)
Answer ANY FIVE Questions

21. Define Interrupt and ISR, also explain the context switch operation with respect to process execution.

22. How a process status is maintained in operating system? Explain the process states a process can take up during its life time.

23. Define the term deadlock, explain the various recovery methods for handling a deadlock.

24. What is the critical section of a problem? Explain the two process solution proposed by Peterson.

25. Explain Belady's anomaly with an example.

26. What is compaction? When and how it is done?

27. Define file. Explain any two free space management techniques with respect to secondary storage management.

PART – C (5 × 12 = 60 Marks)
Answer ALL Questions

28. a. Explain the following system calls used for process management
   (i)   Fork ( )
   (ii)   Execv ( )
   (iii) Wait ( )
   (iv)   Getppid ( )
   (v)   Sleep ( )
   (vi)   Exit ( )

(OR)

b.i. Discuss the addressing modes of X86 processor.

ii. Short notes on threads.

29. a.i. What is dispatch latency? Explain earliest-deadline-first scheduling.

ii. Write short notes on types of schedulers.

(OR)

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b.i. What are semaphores? Explain the operations performed on it.

ii. Compute the average waiting time for the following preemptive priority scheduling.

Process number	CPU burst time	Arrival time	Priority number
P1	8	3	2
P2	10	1	3
P3	12	0	1
P4	7	2	4

30. a.i. Explain the partition memory management and discuss about first-fit, best-fit and worst-fit strategies.

ii. Discuss the steps in handling page-fault interrupts.

(OR)

b.i. Explain segmented memory management.

ii. Explain the hardware support of paged memory management.

31. a.i. Explain thrashing. Discuss the cause of thrashing and discuss about working-set model.

ii. Write short notes on virtual file systems.

(OR)

b. Explain the page replacement algorithms for the reference string 1, 4, 3, 5, 4, 5, 1, 3, 4, 1. Apply FIFO page replacements optimal page replacement and LRU page replacement algorithms for page frames of size 3 and 4.

32. a. Explain with suitable example the various disk scheduling algorithms (FIFO, SSTF, SCAN, C-SCAN and look scheduling).

(OR)

b. Explain in detail on various disk allocation methods.

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