

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Scheme of Valuation/Answer Key**  (Scheme of evaluation (marks in brackets) and answers of problems/key) | | | | | |
| **APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**  **FOURTH SEMESTER B.TECH DEGREE EXAMINATION, MAY 2019** | | | | | |
| **Course Code: CS204** | | | | | |
| **Course Name: OPERATING SYSTEMS (CS)** | | | | | |
| Max. Marks: 100 | | |  | Duration: 3 Hours | |
| **PART A** | | | | | |
| ***Answer all questions. Each carries 3 marks.*** | | | | | |
|  | | | | | |
| 1 |  | Explanation on system calls and its need in an OS. | | | 3 |
| 2 |  | The bootstrap program or bootstrap loader locates the Kernel and loads it to main memory. | | | 3 |
| 3 |  | Long term scheduler controls the degree of multi-programming. It also makes sure that there is a proper mix of CPU bound and I/O bound process in the system. | | | 3 |
| 4 |  | Explanation on thread and how it differs from a process. | | | 3 |
| **PART B** | | | | | |
| ***Answer any two questions. Each carries 9 marks.*** | | | | | |
| 5 |  | Explanation on Kernel data structures like Lists, Stacks, Queues, Trees, Hash Functions and Maps, Bitmaps. | | | 9 |
| 6 |  | Explanation on the different states of a process. (6 marks)  Diagram (3 marks) | | | 9 |
| 7 |  | Shared memory can be used for this case. Explanation. | | | 9 |
| **PART C** | | | | | |
| ***Answer all questions. Each carries 3 marks.*** | | | | | |
| 8 |  | Difference between counting and binary semaphore. | | | 3 |
| 9 |  | Syntax of a monitor with a brief explanation. | | | 3 |
| 10 |  | Preemptive scheduling explanation (2 marks)  Disadvantage (1 mark) | | | 3 |
| 11 |  | Brief explanation on the four conditions that causes deadlock in a system. | | | 3 |
| **PART D** | | | | | |
| ***Answer any two questions. Each carries 9 marks.*** | | | | | |
| 12 |  | Critical-section requirements (3 marks)  Solution (either using test\_and\_set() or any other, that satisfies all the critical section requirements) (6 marks) | | | 9 |
| 13 |  | i) SRT Scheduling Algorithm:Gantt Chart (2.5 marks)   |  |  |  |  |  | | --- | --- | --- | --- | --- | | P1 | P3 | P1 | P4 | P2 | |  |  |  |  |  |   0 3 4 6 8 12  Average Waiting Time : (1+6+0+1)/4 = 8/4= 2 ms(1 mark)  Average Turnaround Time: (6+10+1+3)/4 = 20/4 = 5ms(1 mark)  ii) Priority Scheduling Algorithm Gantt Chart (2.5 marks)   |  |  |  |  |  | | --- | --- | --- | --- | --- | | P1 | P2 | P3 | P1 | P4 | |  |  |  |  |  |   0 2 6 7 10 12  Average Waiting Time : (5+0+3+5)/4 = 13/4= 3.25 ms(1 mark)  Average Turnaround Time: (10+4+4+7)/4 = 25/4 = 6.25ms(1 mark)  or  Marks may also be given for Non preemptive Priority Scheduling Gantt Chart (2.5 marks)   |  |  |  |  | | --- | --- | --- | --- | | P1 | P2 | P3 | P4 | |  |  |  |  |   0 5 9 10 12  Average Waiting Time : (0+3+6+5)/4 = 14/4 ms(1 mark)  Average Turnaround Time: (5+7+7+7)/4 = 26/4 ms(1 mark) | | | 9 |
| 14 |  | Need matrix  The system is in safe state and the safe sequence is <P5, P2, P3, P1, P4>.  Solution with proper explanation. | | | 2  7 |
| **PART E** | | | | | |
| ***Answer any four questions. Each carries 10 marks.*** | | | | | |
| 15 | a) | Difference between logical address and physical address. Explanation. (2 marks)  Example showing how physical address is generated from logical address and relocation register value. (2 marks) | | | 4 |
|  | b) | Dynamic storage allocation problem, explanation (3 marks)  Brief explanation on three strategies namely first fit, best fit, worst fit. (3 marks) | | | 6 |
| 16 | a) | Demand paging explanation (2 marks), Advantages (2 marks) | | | 4 |
|  | b) | i) FIFO replacement algorithm, Page faults = 11 (3 marks)  ii) Optimal replacement algorithm, Page faults = 6 (3 marks) | | | 6 |
| 17 | a) | Paging concept explanation with an example showing address translation. | | | 6 |
|  | b) | Paging suffers from internal fragmentation. Explanation | | | 4 |
| 18 | a) | Sequential access and direct access comparison. | | | 4 |
|  | b) | Access rights are used to provide protection to the files. Explanation on access control bits and how it is used to control user access on files. | | | 6 |
| 19 | a) | Explanation on the low level formatting and high level formatting. | | | 5 |
|  | b) | Swap space explanation. Use of swap map to manage swap space in Linux. | | | 5 |
| 20 | a) | Explanation on FCFS (3 marks), SSTF (3.5 marks) and SCAN (3.5 marks) disk scheduling algorithms using the given disk queue of request.  FCFS= 410  SSTF= 262  SCAN= 278 (for left to right movement) or 280(for right to left movement) | | | 10 |