H Roll No. .....

TCS/TIT–503

B. TECH. (CS/IT) (FIFTH SEMESTER)
MID SEMESTER EXAMINATION, 2018

OPERATING SYSTEM

Time : 1:30 Hours

Maximum Marks : 50

Note : (i) This question paper contains two Sections.

(ii) Both Sections are compulsory.

Section—A

1. Fill in the blanks : (1×5=5 Marks)

   (a) ..... is the unit of execution within a process.

   (b) The interval from the time of submission of a process to the time of completion is termed as .....

   (c) The processes that are residing in main memory and are ready and waiting to execute are kept on a list called .....

   (d) Time quantum is defined in .....

   (e) ..... memory is assigned to a process in New state.

2. Attempt any *five* parts : (3×5=15 Marks)

(a) For each of the following transitions between process states, indicate whether or not the transition is possible. If it is possible, give an example of one thing that would causes it :

(i) Ready → Run

(ii) Ready → Swapped-Blocked

(iii) Wait → Run

(iv) Wait → Ready

(v) Swapped Blocked → Swapped Ready

(vi) New → Run

(b) Explain the concept of Virtual Machine. Support your answer by giving a example of virtual machine which you use in day to day life.

(c) What do you understand by the Context Switch ? Consider three CPU Intensive processes, which require 10, 20 and 30 time units and arrive at times 0, 2 and 6, respectively. How many context switches are needed if the O. S. implements a shortest remaining time first scheduling algorithm ? Do not count the Context Switch at time zero and at the end.

(d) Why is Process Control Block (PCB) required ? Explain the detailed concept of PCB by giving a suitable figure.

(e) Draw a figure and show how a program looks like in memory ?

(f) fork();
fork();
(fork();
The total number of child processes created for above is ? Explain by making a tree for it.

Section—B

3. Attempt any *two* parts of choice from (a), (b) and (c). (5×2=10 Marks)

Process	Burst Time	Arrival Time	I/O Burst
P1	3, 6	0	7
P2	3, 1	1	8
P3	1, 1	2	8

(a) Consider 3 processes P1, P2 and P3 with compute burst time as given in above table. Consider the First Come First Serve scheduling algorithm. Find out the Average Turn Around Time, Average Response Time, Average Waiting Time, Throughput and CPU Utiiization.

(b) How many processes would be generated after execution of this program ? Explain your answer by making a proper tree :

```
# include < stdio.h>
# include < unistd.h>
int main()
{  fork();
   fork() && fork() || fork();
   fork();
   printf ("forked\n");
   return 0;
}
```

(c) What is a process ? How is it different from program ? Draw a neat labelled Process state diagram. Explain each and every state separately.

4. Attempt any *two* parts of choice from (a), (b) and (c). (5×2=10 Marks)

(a) There are 4 processes with process id P1, P2, P3 and P4.

The Burst time and Arrival Time for all are given in table.

By using Shortest Job First algorithm (both for pre-emptive and non-pre-emptive) calculate the following :

(i) Average Response Time

(ii) Average Waiting Time

(iii) Average Turn-around Time

Process	Arrival Time	Burst Time
P1	0.0	5.5
P2	0.5	6.5
P3	1.5	1.5
P4	2.5	3.5

(b) There are 4 processes with process id P1, P2, P3, P4. The relevant information for each is given in table. Priority based scheduling algorithm is used with pre-emption. Find out the following : Average Waiting Time, Average Response Time, Average Turn-around Time, Throughput and CPU utilization :

Process	Burst Time	Arrival Time	Priority
P1	5	0	3
P2	7	1	2
P3	3	2	4
P4	10	3	1

(c) Differentiate between Long Term Scheduler, Middle Term Scheduler and Shortest Term Scheduler. Also, explain the role of Dispatcher.

5. Attempt any *two* parts of choice from (a), (b) and (c). (5×2=10 Marks)

(a) For the processes listed in table, draw a Gantt chart illustrating their executing using :

(i) First Come First Served
(ii) Shortest Job First
(iii) Shortest Remaining Time
(iv) Round Robin (Time Quanta = 2)
(v) Round Robin (Time Quanta = 1)

Process	Arrival Time	Burst Time
P1	0.000	3
P2	1.001	6
P3	4.001	4
P4	6.001	2

(b) By using the multi-level queue scheduling, calculate the average waiting time and average turn around time for the following processes given in table :

P. No.	Arrival Time	Burst Time	Type	Scheduling
P1	0	2	System	Round Robin (TQ =1ms)
P2	1	2	System	Round Robin
P3	1	3	Staff	FCFS
P4	1	4	Staff	FCFS
P5	2	5	User	Round Robin (TQ = 4 ms)

(c) Explain the following (any *five*) :

(i) Degree of Multi-programming
(ii) Interrupt (Software and Hardware)
(iii) Thread (kernel and user both)
(iv) System Call
(v) Bootstrap Program
(vi) Multi-programming, Multi-tasking and Multi-processing