Total No. of Pages: 3

Roll No.....

5th SEMESTER

B. Tech. (MC)

END SEMESTER EXAMINATION

(NOVEMBER-2017)

MC 301: Operating System

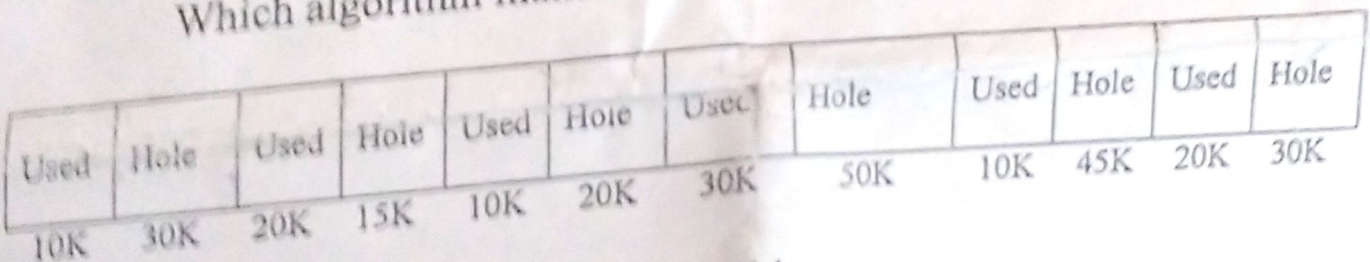
Time: 3:00 Hours

Max. Marks: 40

Note: Answer **any five** questions. Assume suitable missing data, if any.

Q1. a) Discuss in brief the following type of operating systems: batch system, time sharing, real time and distributes systems. (4)

b) On a system using variable partition memory allocation, assume memory is allocated as specified in the diagram given below, before additional requests for 10K, 25K and 20K (in that order) are received. At what starting address will each of the additional requests be allocated by using Best fit and Worst fit algorithm. Which algorithm makes the most efficient use of memory? (4)



Q2. a) For the processes listed in the table:

Process	Arrival Time	CPU Burst Time	Priority
A	0.000	5	4
B	2.001	4	2
C	2.001	2	6
D	4.001	4	3

Draw a chart illustrating their execution using the algorithms mentioned below and also find out the average turnaround time (rounding to the nearest hundredth) and average waiting time (rounding to the nearest hundredth) in each case. A larger priority number has higher priority.

i) Priority (Preemptive) ii) Round Robin (quantum 1) (4)

b) On a system using fixed partition memory allocation, the memory is partitioned as 100kB, 400kB, 200kB, 500kB, 300kB, in order. How would each of the Best fit and Worst fit algorithm place these processes of 202kB, 407kB, 102kB, 406kB? Which algorithm makes the most efficient use of memory? (4)

Q3. a) Explain the concept of Process Control Block (PCB). (2)
b) Explain different states of a process by using diagram. (2)
c) From the process resource usage and availability given below draw the Resource Allocation Graph and by using it check whether the system is Deadlocked or not? (4)

Process	Current Allocation			Outstanding Requests			Resources Available		
	R_1	R_2	R_3	R_1	R_2	R_3	R_1	R_2	R_3
P_1	2	0	0	1	1	0			
P_2	3	1	0	0	0	0			
P_3	1	3	0	0	0	1	0	0	0
P_4	0	1	1	0	2	0			

Q4. a) On a simple paged system TLB hold the most active page entries and the full page table is stored in the main memory. If a memory reference takes 210ns and finding a page table entry in the TLB takes 90ns, then what must be the hit ratio to achieve effective access time of 330ns? (4)

b) On a system using simple segmentation, compute the physical address for each of the logical address, given the following segment table. If the address generates a segment fault, indicate so.

Segment	Base	Length/Bound
0	1100	500
1	2500	1000
2	200	600
3	4000	1200

i) 0,300 ii) 2,800 iii) 1,600 iv) 3,1100 (4)

Q5. a) Explain Belady's anomaly with an example when number of frames increases from three to four and FIFO page replacement algorithm is used. (4)

b) What are the major methods of allocating disk space to the files? Discuss the merits and demerits of each method. (4)

Q6. Write a short note on any four of the following: (2*4=8)

a) Internal fragmentation
b) External fragmentation
c) Overlaying
d) Pre-Paging
e) Thrashing.

Q7. a) Given references to the following pages by a program,

0,1,4,2,0, 2,6,5,1,2, 3,2,1,2,6, 2,1,3,6,2.

How many page faults will occur if the program has three page frames available to it and uses:

i) LRU page replacement algorithm?
ii) ii) Optimal page replacement algorithm? (4)

b) Suppose a disk has 1000 cylinders with numbers from 0 to 999. Let the last request serviced was at track 756 and the head is moving toward track 0. Seek time is 4ms per cylinder move. The disk requests are received by a disk drive for cylinders in the order 811, 348, 153, 968, 407, 500. Compute the number of tracks the disk arm must move and the seek time needed to satisfy all the requests in the disk queue by using:

i) FCFS ii) SSTF iii) SCAN iv) LOOK. (4)

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ROLL NO. MA14P

FIFTH SEMESTER B.Tech. Mathematics & Computing

END SEMESTER EXAMINATION, Nov 2017

Code & Title: MC 303 Stochastic Processes

Time: 3:00 Hours

Max. Marks : 40

Note : Answer all question by selecting any two parts from each questions. All questions carry equal marks. Assume suitable missing data, if any.

1[a] Differentiate between a random variable and random process by giving a suitable example. Give the classification based on state and parameter of a stochastic process. Give an example of each type and their graphical representations.

[b] People arrive at a bus stop according to a poisson process with rate λ. Buses arrive at the stop according to a poisson process with rate μ. A bus when arrives picks up everybody who is waiting. Find the expected value and the variance of the number of people who get on a bus.

[c] Describe birth and death process. As a special case find transient solution for pure birth process.

2[a] Describe random walk with two absorbing barriers. By considering a suitable example of your choice find the probability of absorption at a specific barrier.

[b] Show that in case of an unrestricted simple random walk, if the probability of a jump upward is less than the probability of a jump downward, then the particle will drift to $-\infty$ with probability one.

[c] Discuss simple random walk with two reflecting barriers. Find its steady state solution. How can you modify this model as with one reflecting barrier and one absorbing barrier?

3[a] What is a Bernoulli process? Give example. State properties of a Bernoulli process. Show that it is a Markov process. Is a non homogeneous Bernoulli process also Markov process ?

[b] What's an ergodic Markov chain. Give an example of your choice resulting in an ergodic Markov chain. Find the steady state probability distribution for that.

[c] A particle performs a random walk with absorbing barriers at 0 and 4. The probability for a positive jump is ½, the probability for a negative jump is 1/3, and the probability for the no jump is 1/6. If at present the particle is at position 3 then find the probability that it will revisit 3 after four steps.

4[a] Explain renewal function and renewal density in context with a renewal process. Derive renewal equation and find its solution.

[b] In case of a Markov chain define transient and recurrent states. Show that in case of a transient state i, $\sum_0^\infty p_{ii}^{(n)} < \infty$. Verify this by considering a suitable example.

[c] Define a Markov chain. Give example. How do you find n-step transition probability matrix of a Markov chain. Derive Chapman Kolmogorov equations.

5[a] Describe M/M/1/N queue model. By considering arrival rate as 3, departure rate as 2, and N = 20 find the mean queue length and the mean system length in steady state.

[b] In M/M/c/c queue system find the probability for customer loss. If arrival rate equals the departure rate, find minimum value of c so that probability of customer loss is not more than 0.1.

[c] In a railway yard goods trains arrive at the rate of 30 trains per day. Assuming that the inter-arrival time follows an exponential distribution and the service time distribution is also exponential with an average of 36 minutes then find the (i) mean queue size, (ii) probability that the queue size exceeds 10, (iii) mean number of trains departed per busy period.

Total No of pages: 02 Roll Number MC105

B. Tech Fifth Semester Examination November-2017

MC-305 Operations Research

Time 3:00 Hours Maximum marks: 40

Answer any five questions, and each question has equal marks.

1. A company makes two products, called X and Y, from a mix of chemicals. The mix is made up of three raw materials identified by the letters A, B and C. 45% of the mix must be raw material A and no more than 30% of the mix may be raw material C. After processing the mix, the products are withdrawn in the proportion 40% - X, 20%-Y and 40% is a waste product, not have any value. Up to 1000 kg of X can be sold for $12 per kg. Product Y is sold $18 per kg for amount up to 2000 kg. No more than 1000 kg of X or 2000 kg of Y may be produced. The processing cost of the mix is $1.50 per kg. Material A costs $6 per kg for any amount, material B costs $3 per kg up to 2500kg. Raw material C is free for up to 1500 kg. No more than 2500 & 1500 kg of raw materials B and C are available respectively. Formulate the Linear programming problem also write its dual problem.

2. Use two phase simplex method to solve the following LPP.
Maximize $z = 5x_1 - 4x_2 + 3x_3$
Subject to $2x_1 + x_2 - 6x_3 = 20$; $6x_1 + 5x_2 + 10x_3 \leq 76$;
$8x_1 - 3x_2 + 6x_3 \leq 50$ and
$$x_1, x_2, x_3 \geq 0$$

3. Apply Gomory method and find the optimum solution to the following integer programming problem
Maximize $z = x_1 + x_2$
Subject to $3x_1 + 2x_2 \leq 5$; $x_2 \leq 2$; $x_1, x_2 \geq 0$ and are integers.

4. A city administration has two petroleum refinery plants with daily petroleum production of 6 million litters and 9 million litters respectively. The administration must fulfil needs of its three distribution stores transporting petroleum from each of the plants. The requirement of the distribution stores 1, 2 and 3 are 7, 5 and 3 million litters respectively, cost of shipping one million litters of petroleum from each plant to each distribution store is given in hundred of rupees bellow. Formulate a L.P model to minimize the transportation cost and solve it,

	Distribution stores			
Plants	D1	D2	D3	Supply
P1	2	3	11	6
P2	1	9	6	9
Requirement	7	5	3	

5. A communication satellite manufacturer estimates completion time of certain activity units constituting a PERT network. The optimistic time t_o, mean time t_m and pessimistic time t_p are given bellow

Arc	Activity	t_o	t_m	t_p
1-2	Design of the satellite architecture and structure	1	1	7
1-3	Design of the Communication system channel	1	4	7
1-4	Design of the power grid and batteries	2	2	8
2-5	Design of the solar panel	1	1	1
3-5	Design of Microwave sensor antenna and transponder	2	5	14
4-6	Effective orbit trajectory and power utility designing	2	5	8
5-6	Satellite power and motion control system designing	3	6	15

(a)Draw the project network and identify all the paths through it

(b) Determine the expected project length and

(c) Calculate the standard deviation & variance of project length using above mentioned fact.

6. A company faced with the problem of assigning six different machines to five different jobs. Operating costs (hundreds of rupees) are estimated as follows

Machines	Jobs				
	A	B	C	D	E
I	2.5	5	1	6	1
II	2	5	1.5	7	3
III	3	6.5	2	8	3
IV	3.5	7	2	9	4.5
V	4	7	3	9	6
VI	6	9	5	10	6

Solve the problem, assuming that the objectives is to minimize the total cost.

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Roll No. MC105

Fifth SEMESTER B. Tech.

EndsemExamination **NOV 2017**

HU-301 Technical communication

Time: 3.00 hours *Max Marks: 50*

Note: **Answer all the questions**
Assume suitable missing data, if any

1. Do as directed: 10

i) Choose Synonym for Spew:
a) take up liquids b) throw in water c) to come forth in a flush
d) split

ii) Choose a Synonym for Attrition:
a) attraction b) happiness c) strengthening d) decline

iii) Choose Antonym for Dissonance:
a) anguish b)accord c)symphony d) music

iv) Antonym for Taciturn
a) Loquacious b) Reticent c) Chivalrous d)Onerous

v) Antonym for Feasibility:
a) Attitude b) Attainable c) Unattainable d) Final

vi) Synonym of Repugnant
a) Kind b) cruel c) ugly d) zeal

vii) Synonym for Banal
a) Wonder b) Amicable c) Cheerful d) Ordinary

viii) Antonym for Kindle
a) Despicable b) extinguish c) colour less d) Austere

ix) The full form of p.m. (in the context of time eg 5p.m) is
a) Pre meridiem b)post meridiem c) post meridian d) post miracle

x) Synonym for *en route* is
a) Beyond one's power b) on the way c) indefinitely d) solid earth

2. Write short notes with examples on any two of the following:

10

a) Elements of Report Writing

b) Agenda

c) Netiquettes

3. GD is the best way to assess a candidate's body language and attitude'. Discuss.

Or

What special efforts will you make to prove yourself as the best candidate for a job in your dream company?

10

4. You are the Manager of a company called Solutions ABC. The CEO is not happy with the last year's report of the company. Draft a proposal to inform and convince the CEO about the following:4+3+3

i) Plan of action (next 3 years)

ii) Corrective Action to be taken

iii) Extra Resources needed for Plan Implementation.

5. As the sales manager of XYZ Company, draft a reply in the form of an e-mail for two customers who have complained about your product. Imagine necessary details.

10

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