

Roll No

- ii) The probability that X is at most 31 seconds.
[Give that area under the standard normal curve between $x = 0$ to $x = .91$ is 0.2637, between $x = 0$ and $x = 1.36$ is 0.1582 and between $x = 0$ and $x = 1.81$ is 0.0775].

b) Write short note on each of the followings:

- i) Quality and reliability
- ii) MTTR
- iii) MTBF
- iv) System Reliability

MVCT/MBCT/MVCP - 101

M.E./M.Tech., I Semester

Examination, June 2016

Advance Mathematics

Time : Three Hours

Maximum Marks : 70

Note : Attempt any five questions. All questions carry equal marks.

1. Food X contains 6 units of vitamin A per gram and 7 units of vitamin B per gram and costs 12 paise per gram. Food Y contains 8 units of vitamin A per gram and 12 units of vitamin B per gram and costs 20 paise per gram. The daily minimum requirement of vitamin A and vitamin B is 100 units and 120 units respectively. Find the minimum cost of product mix by the simplex method.

2. What do you mean by assignment problems? A machine tool company decides to make four subassemblies namely S_1 , S_2 , S_3 and S_4 through four contractors namely C_1 , C_2 , C_3 and C_4 . Each contractor is to receive only one subassembly. The cost of each subassembly is determined by the bids submitted by each contractor and is shown in the following table in hundreds of rupee.

	C_1	C_2	C_3	C_4
S_1	15	13	14	17
S_2	11	12	15	13
S_3	13	12	10	11
S_4	15	17	14	16

Assign the different subassemblies to contractors so as to minimize the total cost.

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3. Tasks A, B, C,...,H, I constitute a project. The precedence relationships are

$$A < D; A < E; B < F; D < F; C < G; C < H; F < I; G < I$$

Draw a network to represent the project and find the minimum time of completion of the project when time, in days, of each task is as follows:

Task	A	B	C	D	E	F	G	H	I
Time	8	10	8	10	16	17	18	14	9

Also, identify the critical path.

4. Write a short note on PERT. The time estimates (in weeks) for the activities of a PERT network are given below:

Activity	t_0	t_m	t_p
1-2	1	1	7
1-3	1	4	7
1-4	2	2	8
2-5	1	1	1
3-5	2	5	14
4-6	2	5	8
5-6	3	6	15

Draw the project network and identify all the paths through it. Also, determine the expected project length and standard deviation of the project length.

5. In a game of matching coins, player A wins Rs.2 if there are two heads, wins nothing if there are two tails and loses Rs.1 when there are one head and one tail. Determine the payoff matrix, best strategies for each player and the value of game to A.

6. Give a general structure of the queuing system and explain it. Prove that if the number of arrivals follows Poisson distribution, then the inter arrival time follows exponential distribution. <http://www.rgpvonline.com>

7. What do you mean by hypothesis testing? Ten individuals are chosen at random from a population and their heights are found to be in inches 63, 63, 64, 65, 66, 69, 69, 70, 70, 71. Discuss the proposal that the mean height of universe is 65. [Given that for 9 degrees of freedom the value of student's t at 5% level of significance is 2.262].

8. a) Experience indicates that the development time X for a photographic printing paper is distributed as $X \sim N(30 \text{ seconds}, 1.21 \text{ seconds}^2)$. Then find:

i) The probability that X is at least 28.5 seconds