

Registration no:

--	--	--	--	--	--	--	--	--	--

Total Number of Pages: 02

MTECH
EYPE207

2nd Semester Back Examination – 2016-17
QUANTITATIVE METHODS FOR ENERGY MANAGEMENT AND PLANNING
BRANCH(S): ENERGY SYSTEMS ENGG

Time: 3 Hours

Max Marks: 70

Q.CODE:Z1087

Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.

- Q1 Answer the following questions: (2 x 10)**
- a) What is meant by the term 'Linear Programming'?
 - b) What is 'Unbalanced Transportation Problem'?
 - c) What is CPM?
 - d) State the assumptions of CPM/PERT.
 - e) What is 'Simulation'?
 - f) What is 'Queuing Model'?
 - g) What is Queue Discipline?
 - h) What is Crashing in a CPM /PERT network?
 - i) What is an infeasible assignment?
 - j) What is a convex set?
- Q2 a) The XYZ company during the festival season combines two factors A and B to form a gift pack which must weigh 5 kg. At least 2 kg. of A and not more than 4 kg. of B should be used. The net profit contribution to the company is Rs. 5 per kg. for A and Rs. 6 per. for B. Formulate LP Model to find the optimal factor mix. (5)**
- b) Enumerate the steps involved in the simulation process. (5)**
- Q3 a) Explain the following terms in PERT (5)**
- 1. Optimistic Time
 - 2. Expected Time
 - 3. Activity Variance
 - 4. Standard Deviation of the project
 - 5. Name the distribution followed by activity time in PERT Model.
- b) State the relationship between Poisson Process and Exponential Probability Distribution. (5)**
- Q4 Solve the following problem using Simplex Method: (10)**
- Maximize $Z = 21x_1 + 15x_2$
Subject to the constraints:
 $-x_1 - 2x_2 \geq -6$
 $4x_1 + 3x_2 \leq 12$
 $x_1 \geq 0, x_2 \geq 0$

- Q5** The management of ABC company is considering the question of marketing a new product. The fixed cost required in the project is Rs. 4,000. Three factors are uncertain viz. the selling price, variable cost and the annual sales volume. The product has a life of only one year. The management has the data on these three factors as under: **(10)**

Selling Price Rs.	Probability	Variable Cost Rs.	Probability	Sales Volume Units	Probability
3	0.2	1	0.1	1,000	0.3
4	0.3	2	0.6	2,000	0.2
5	0.5	3	0.3	3,000	0.5

Consider the following sequence of thirty random numbers:

81, 32, 60, 04, 46, 31, 67, 25, 24, 10, 40, 02, 39, 68, 08, 59, 66, 90, 12, 64, 79, 31, 86, 68, 82, 89, 25, 11, 98, 16.

Using the sequence (First 3 random numbers for the first trial, etc.) simulate the average profit for the above project ...

- Q6** a) What is transportation problem? Define the terms: origin, destination and unit transportation cost. **(5)**
- b) What is 'Balanced Transportation Problem? Give an example. **(5)**
- Q7** a) A company has two grades of inspectors, 1 and 2 to undertake quality control inspection. At least 3,500 pieces must be inspected in an 8 hour day. Grade 1 inspector can check 50 pieces in an hour with an accuracy of 95%. Grade 2 inspector checks 25 pieces an hour with an accuracy of 90%. The daily wages of grade 1 inspectors are Rs. 6 per hour while those of grade 2 inspectors are Rs. 5 per hour. Any error made by an inspector costs Rs. 4 per piece to the company. If there are, in all, 20 grade 1 inspectors and 25 grade 2 inspectors in the company, find the optimal assignment of inspectors that minimizes the daily inspection cost. Formulate the LP problem. **(10)**
- Q8** Write short notes(Any Two) of the following. **(5 x 2)**
- Decision Tree
 - Unbalanced assignment problem
 - Constraints in LPP
 - Degeneracy