**Registration No :** | | | | | | | | | | |

**Total Number of Pages : 02** **M.Tech.**
**P2PECC13**

**2nd Semester Regular Examination 2017-18**
**QUANTITATIVE METHODS FOR ENERGY MANAGEMENT & PLANNING**
**BRANCH : ELECTRI & ELECTRO ENGG (POWER SYSTEM ENGG), ELECTRICAL AND ELECTRO ENGG, ELECTRICAL ENGG., ELECTRICAL POWER SYSTEM, ENERGY SYSTEMS ENGG, POWER AND ENERGY ENGG, POWER ELECTRO, POWER ELECTRO & DRIVES, POWER ELECTRO AND ELECTRICAL DRIVES, POWER ELECTRO AND POWER SYSTEMS, POWER ENGG AND ENERGY SYSTEMS, POWER SYSTEM ENGG, POWER SYSTEMS**
**Time : 3 Hours**
**Max Marks : 100**
**Q.CODE : C1080**
**Answer Question No.1 which is compulsory and any FOUR from the rest.**
**The figures in the right hand margin indicate marks.**
**Answer all parts of a question at a place.**

**Q1** **Answer the following questions:** ***Short answer type*** **(2 x 10)**

**a)** What is LPP ?
**b)** What is forecasting ?
**c)** Describe sensitivity analysis.
**d)** Define Integer Programming Problem.
**e)** Describe Branch and Bound Method.
**f)** What is Sequencing Problem ?
**g)** What is Regression Analysis ?
**h)** Describe Non-Linear Programming.
**i)** What is Dynamic Programming ?
**j)** Describe Laplace Criteria.

**Q2** **a)** What do you mean by Conditional Probability ? State Baye's Theorem and explain its role in management decision making. **(10)**

**b)** Formulate the problem as a L.P.P.. **(10)**
A firm manufactures three products A, B, C. Time to manufacture product A is twice that for B and thrice that for C and if the entire labourer is engaged in making product A, 2400 units of this product can be produced. These products are to be produced in the ratio 4 : 2: 3. There is demand for at least 260, 310 and 240 units of products A, B and C and profit earned per unit is Rs. 80/-, Rs. 30/- and Rs. 50/- respectively.

**Q3** **a)** Solve the given LPP by Simplex Algorithm. **(10)**

$$Max\ z = 10x_1 + 2x_2$$
s.t. $x_1 + x_2 \le 1$
$2x_1 + 3x_2 \le 2$
Where $x_1,\ x_2 \ge 0$

**b)** Solve the given LPP by Graphical Method. **(10)**

$Max\ z = 6x_1 + 12\, x_2$
s.t. $x_1 + x_2 \le 20,$
$2x_1 + x_2 \le 70,$
$x_1 + 3x_2 \le 40$ Where $x_1,\ x_2 \ge 0$

**Q4** **a)** Find the optimal solution to the following Integer Programming Problem. **(10)**

$Max\ z = x_1 - x_2$

s.t. $x_1 + 2x_2 \leq 4,$

$6x_1 + 2x_2 \leq 9,$

Where $x_1,\ x_2\ \geq 0$ and $x_1,\ x_2$ *are integers*.

**b)** There are seven jobs, each of which has to go through the machines A & B in the order AB. Processing times in hours are given as **(10)**

| Job | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| Machine A | 3 | 12 | 15 | 6 | 10 | 11 | 9 |
| Machine B | 8 | 10 | 10 | 6 | 12 | 1 | 3 |

Determine a sequence of these jobs that will minimize the total elapsed time T also find T and idle time for machine A & B.

**Q5** **a)** In a railway marshalling yard, goods trains arrive at a rate of 30 trains per day. Assuming that the inter arrival time follows an exponential distribution and the service time distribution and the service time distribution is also exponential with an average 36 minutes. Calculate the following : **(10)**

(i) the mean queue size and

(ii) the probability that the queue size exceeds 10.

If the input of trains increases to an average 33 per day, what will be the change in answers of (i) and (ii).

**b)** Differentiate PERT and CPM networks. **(10)**

**Q6** **a)** A farmer wants to decide which of the three crops he should plant on his 100-acre farm. The profit from each is dependent on the rainfall during the growing season. The farmer has categorized the amount of rainfall as high, medium and low. His estimated profit for each is shown in the table below : **(10)**

| **Estimated conditional profit** | **Rainfall** | | |
|---|---|---|---|
| | High | Medium | Low |
| Crop A | 8000 | 4500 | 2000 |
| Crop B | 3500 | 4500 | 5000 |
| Crop C | 5000 | 5000 | 4000 |

If the farmer wants to plant only one crop, decide which should be his best crop using

(i) Maximax Criterion

(ii) Maximin Criterion

**b)** Discuss Maximax Criterion, Maximin Criterion, Minimax Regret Criterion and Laplace Criterion. **(10)**

**Q7** **a)** **Write Short Notes on :** **(10)**

(i) Markov Analysis

(ii) Queueing Models

**b)** Use dynamic programming to solve the following problem : **(10)**

$Min\ z = y_1^2 + y_2^2 + y_3^2$

s.t. $y_1 + y_2 + y_3 \leq 10$

Where $y_1, y_2, y_3\ \geq 0$