

SUBJECT CODE :- K-51
FACULTY OF ENGINEERING AND TECHNOLOGY
B.E. (Mech) Examination Nov/Dec 2015
Project Management and Operations Research
(Revised)

[Time: Three Hours]

[Max. Marks: 80]

“Please check whether you have got the right question paper.”

- N.B
- i) Attempt three questions from each section.
 - ii) Assume suitable data if necessary
 - iii) Figures to the right indicate full marks

SECTION-A

- Q1. a) Define ‘operations Research’ & give its applications 05
 b) An aero plane can carry a maximum of 250 passengers. A profit of Rs.1500 is made on each executive class ticket & a profit of Rs. 08 900 is made on each economy class ticket. The airline reserves at least 30 seats for executive class. However at least 4 times as many passengers prefer to travel by economy class then by executive class. Formulate this problem as a LPP & solve graphically.

- Q.2 Solve the following LPP using Big. M Method 13

Minimize $z=2x_1+3x_2$

Subject to $x_1+x_2 \geq 5$

$x_1+2x_2 \geq 6$

& $x_1, x_2 \geq 0$

- Q.3 Solve the following LPP using two phase simplex method 14

Maximize $z=x_1+2x_2+4x_3$

Subject to $2x_1+x_2+x_3 \leq 8$

$3x_1+2x_2+3x_3 \leq 21$

$x_1+2x_2+4x_3 \geq 26$

& $x_1, x_2, x_3 \geq 0$

- Q.4 Find the optimum solution to the following transportation problem in which the cell contain the transportation cost in rupees. 13
 Find IBFS using lowest cost entry method

	W₁	W₂	W₃	W₄	W₅	available
F₁	7	6	4	5	9	40
F₂	8	5	6	7	8	30
F₃	6	8	9	6	5	20
F₄	5	7	7	8	6	10
Required	30	30	15	20	5	

- Q.5 a) Find an optimal solution to assignment problem with the following cost matrix 06

	J₁	J₂	J₃	J₄
M₁	10	5	5	2
M₂	9	8	4	3
M₃	7	7	6	4

M_4	8	7	5	5
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- b) The cost of equipment is 62000 & its scrap value is Rs. 2000. The life of the equipment is 8 years. The maintenance costs for each 07 year are as given below.

Year	1	2	3	4	5	6	7	8
Maintenance Cost(Rs.)	1000	2000	3500	5000	8000	11000	16000	24000

When the equipment should be replaced?

Section B

- Q.6 a) Customers arrive at one person barber shop according to a Poisson process with a mean inter-arrival time of 20 minutes. 08
customers spend on an average of 15 minutes in the barber's chair. Find

- The probability that a new arrival need not wait for the barber to be free
- The expected number of customers in the barber shop
- The time that a customer is required to wait for his turn
- The time that a customer is required to spend in the shop

- b) Five jobs are performed first on machine M1 and then on machine M2. Time in hours taken by each jobs on each machine is 06
given below.

jobs		M1	M2
	A	5	2
	B	1	6
	C	9	7
	D	3	8
	E	10	4

Determine the optimum sequence of jobs & find the minimum elapsed time & idle time for both machines.

- Q.7 a) Explain the dominance property to find value of game with an example 05

- b) Reduce the following game by dominance & find the game value. 08

		Player B			
		i	ii	iii	iv
Player A	I	3	2	4	0
	ii	3	4	2	4
	iii	4	2	4	0
	iv	0	4	0	8

- Q.8 a) Explain the various costs associated with inventories 05

- b) A annual demand for an automobile component is 24,000 units. The carrying cost is Re 0.40/units/year, the ordering cost is 08
Rs.20.00 per order & the shortage cost is Rs.10.00/units/year. Find

- Economic order quantity
- Maximum inventory
- Maximum shortage quantity
- Cycle time.

Q.9

Table below shows the normal duration & cost and crash duration & cost of the various activities in a project. Find the optimum duration & minimum project cost, assuming the overhead cost of Rs.300 per week

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Activity	Normal		Crash	
	Time weeks	Cost Rs	Time weeks	Cost Rs
1-2	2	800	1	1400
1-3	5	1000	2	2000
1-4	5	1000	3	18000
2-4	1	500	1	500
2-5	5	1500	3	2100
3-4	4	2000	3	3000
3-5	6	1200	4	1600
4-5	3	900	2	1600

Q.10

The table below shows the activities & their three time estimates. Draw the network & find the critical path.

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Activity	t _o	t _m	t _p
1-2	2	5	8
2-3	17	20	23
2-4	15	16	23
2-5	3	11	12
3-4	0	0	0
3-6	10	11	12
4-7	13	15	17
5-7	7	7	7
6-7	1	2	3
7-8	7	10	13

Z	1.6	1.7	1.8	0
P%	94.4	96.5	96.9	50

- i) What is the probability of work completion in 50 days?
- ii) Which duration assures the 95% probability of work completion?