SUBJECT CODE NO:- P-314
FACULTY OF ENGINEERING AND TECHNOLOGY
B.E. (Mech) Examination MAY/JUNE-2016
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 <u>any three</u> questions from each section.
       ii) Assume suitable data if necessary.
       iii) Figures to the right indicate full marks.

Section A

Q.1   a) Explain advantages and limitations of operations Research.   05

       b) Solve the following LPP by graphical method.   08
          Maximize Z=40X$_1$+100X$_2$ Subject to constraints,
          $$12X_1 + 6X_2 \leq 3000$$
          $$4X_1 + 10X_2 \leq 2000$$
          $$2X_1 + 3X_2 \leq 900$$
          $$X_1, X_2 \geq 0$$

Q.2   Solve the following LPP by simplex method.   13
          Maximize $Z = 4X_1 + 3X_2$
          Subject to constraints,
          $$3X_1 + 6X_2 \leq 18$$
          $$6X_1 + 4X_2 \leq 24$$
          $$X_1, X_2 \geq 0$$

Q.3   Solve the following LPP by Big-M method.   14
          Maximize $Z = 6X_1 + 4X_2$
          Subject to Constraints,
          $$2X_1 + 3X_2 \leq 30$$
          $$3X_1 + 2X_2 \leq 24$$
          $$X_1, X_2 \geq 0$$

Q.4   Solve the following transportation model using VAM & obtain the Optimum Solution also.   13

				Capacity↓
12	11	10	9	150
13	15	8	5	50
10	14	7	10	70

Requirement →   60   70   80   50

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Q.5   a)   Solve the following assignment Model.   06

JOBS

Workers		A	B	C	D
	1	18	26	17	11
	2	13	28	14	26
	3	38	19	18	15
	4	19	26	24	10

b)   A firm is considering replacement of a machine, whose cost is Rs.12,200/- and the Scrap Value is Rs.200/- The running (Maintenance and operating) cost in rupees are found from experience to be as follows. When should the machine be replaced?   07

Year	1	2	3	4	5	6	7	8
Running Cost (Rs)	200	500	800	1200	1800	2500	3200	4000

Section B

Q.6   a)   A T.V. repairman finds that the time Spent on his jobs has an Exponential distribution with mean 30 minutes. If he repairs sets in the order in which they came in, and if the arrival of sets is approximately Poisson with an average rate of 10 per 8-hour day, what is repairman's expected idle time each day? How many jobs are ahead of the average set just brought in?   08

b)   There are seven jobs, each of which has to go through the machines A and B in the order A → B. Processing times in hours are as follows.   06

Job	1	2	3	4	5	6	7
M/c A	3	12	15	6	10	11	9
M/c B	8	10	10	6	12	1	3

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

Q.7   Solve the following game using dominance property and find the game value (V).   13

Player B

Player A		1	2	3	4	5
	1	4	3	2	-4	-5
	2	-2	-3	-2	1	2
	3	2	1	0	-5	-4

Q.8   a)   What are the reasons for carrying inventories?   05

b)   An oil engine manufacturer purchases lubricants at the rate of Rs.42 per piece from a vendor. The requirement of these lubricants is 1800 per year. What should be the order quantity per order, if the cost per placement of an order is Rs. 16 and inventory carrying charge per rupee per year is only 20 paise.   08

Q.9   The table below gives the information about various activities of network shown in figure.   13

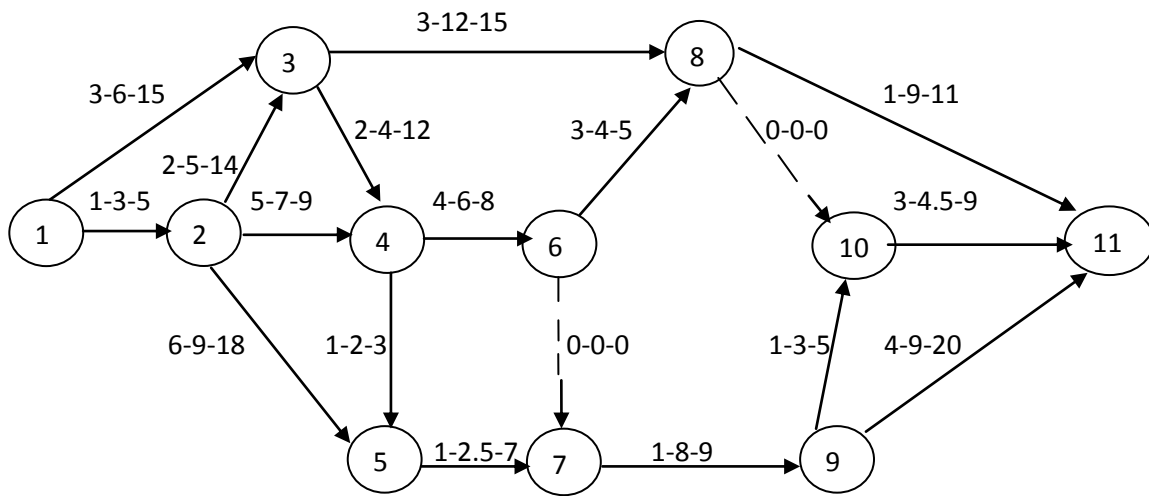| Activity	Normal duration (days)	Normal Cost (Rs.)	Crash duration (days)	Crash Cost (Rs.)
1-2	9	8000	6	9500
2-3	5	5000	3	5500
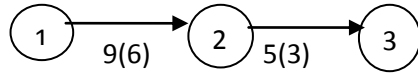
The Project overhead costs are about Rs.300/day. Determine,
1) Direct cost duration relationship
2) Total cost duration relationship, and
3) The corresponding least cost plan (network)

Q.10   A construction company has an opportunity to submit a bid for the construction of a new apartment   13
building. From the specifications provided by the developer, the PERT Network along with the three time
estimates (in Week) for each activity are shown in figure.
Determine:- 1) Critical Path and its standard deviation. 2) Probability of Completing the work in 38 days.
3) Completion time duration for which the company should bid to provide 95% probability of completing
the project in time.

Z	P%
0.246	59.86%
1.65	95%