DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

B. Tech. (All Branches) (Semester – V) Elective II

End Semester Examination November 2017

Sub.: Quantitative Techniques in Project Management (QTPM) **Time: 03 Hours**

Max. Marks: 70

Instructions to the Student:

1. Question No. 1 is compulsory.
2. All questions are compulsory. However, there is internal choice among them.
3. Clearly mention the main question number along with the sub questions.

Que. 1: Select the right choice from the given answers 10

1. An objective function which states the determinants of quantity to be either maximized or minimized is called ----------

(a) Feasible function (b) Optimal function,
(c) Criterion function (d) None of the above

2. In simplex algorithm, which method is used to deal with the situation where an infeasible starting basic solution is given?

(a) Slack variable (b) Simplex method
(c) M- method (d) Graphical method

3. In cyclic traveling salesman problem the elements of diagonal from left top to right bottom are ------

(a) Zeros, (b) All negative elements,
(c) All infinity (d) all ones

4. Basic cells indicate positive values and non-basic cells have ----- value for flow.

(a) Negative (b) Positive
(c) One (d) Zero.

5. Which of the following is an example of purchasing costs?

(a) Incoming freight (b) storage costs
(c) insurance (d) spoilage

6. If purchase order lead time is 35 minutes and number of units sold per time is 400 units ten reorder point will be ----

(a) 14000 units (b) 14500 units
(c) 15000 units (d) 15500 units

7. The most suitable inventory system for a Petrol bunk is -------

(a) P -System, (b) 2 Bin system,
(c) Q -System, (d) Probabilistic model.

8. An arrival in a queue that reneges is one who -----

(a) after joining the queue becomes impatient and leaves (b) refuses to join the queue as it is too long

(c) goes through the queue but never returns
(d) Jumps from one queue to another to get quick service

9. If an activity has zero slack, it implies that----
(a) It lies on the critical path
(b) It is a dummy activity
(c) The project progressing well
(d) None of the above

10. An event that represent the joint completion of more than one activity is known as --------
(a) Burst event
(b) Joint event
(c) Merge event
(d) End event

Que. 2 Solve the following:

(a) An electric appliance company produces two products. Refrigerators and Chillers. Production takes place in two separate departments I and II. The company's two products are sold on a weekly basis. The weekly production cannot exceed 25 Refrigerators and 35 Chillers. The company regularly employs a total of 60 workers in two departments. A refrigerator requires 2 man weeks labour while a Chiller requires 1 man week labour. A refrigerator contributes a profit of Rs. 60 and Chiller contributes a profit of Rs. 40. Formulate the problem as a LPP in order to maximize the profit. Solve Graphically. 9

(b) Show the simplex table used in LPP mathematical procedure. Explain the meaning of each cell terms of the simplex table used in LPP. 3

Que. 3. Solve the following:

(a) Compare the NWCM and VAM methods in respect of allocation sequence, cost consideration, time requirement and suitability of the method in Transportation Problem. 4

(b) The owner of a small machine shop has four machinist available to assign the jobs for a day. Five jobs are offered with an expected profit in Rs. For each machinist on each job as follows:

	A	B	C	D	E
1	62	78	50	101	82
2	71	84	61	73	59
3	87	82	111	71	81
4	48	64	87	77	80

Determine the assignments of machines to Jobs that will result in maximum profit. Which job should be declined? 8

Que. 4 Solve the following

(a) A branch of a nationalized bank has only one typist. Since typing work varies in length (number of pages to be typed), the typing rate is randomly distributed approximating a Poisson distribution with a mean service rate of 8 letters per hour. The letter arrives at a rate of 5 per hour during the entire 8-hour workday. If the typist is valued at Rs. 1.50 per hour, determine:
(a) Equipment utilization,
(b) The percent time an arriving letter has to wait,
(c) Average system time, and
(d) Average idle time cost of the typewriter per day. 8

(b) Show with a neat diagram the components of queuing system and label them. Write in brief about the various states of the queue that will form. 4

Que. 5 Solve any two of the following:

(a) Explain the various costs associated with maintenance which are considered during replacement analysis. Also discuss about the types of replacement policy that are considered while replacing the items. 6

(b) In a paints manufacturing unit, each type of paint is to be ground to a specified degree of fineness. The manufacturer uses the same ball mill for a variety of paints an after completion of each batch, the mill has to be cleaned and the ball charge properly made up. The change over from one type of paint to another is estimated to cost Rs. 80/- per batch. The annual sales of a particular grade of paint are 30,000 liters and the inventory carrying cost is Re.1/- per liter. Given that the rate of production is 3 times the sales rate, determine the economic batch size. 6

(c) Some of the spare parts of a ship cost Rs. 50,000 each. These spare parts can only be ordered together with the ship. If not ordered at the time the ship is constructed, these parts cannot be available on need. Suppose that a loss of Rs. 4,500,000 is suffered for each spare that is needed when none is available in the stock. Further suppose that the probabilities that the spares will be needed as replacement during the life term of the class of ship discussed are:

Demand	0	1	2	3	4	5	6 or more	
Probability	0.9000	0.040	0.025	0.020	0.010	0.005	0.000	Total =1.000

How many spare parts are to be procured with the ship? 6

Que. 6 Solve the following:

(a) Explain the three time estimates of PERT with a normal distribution curve. Also show how the variance of the PERT network is determined and its usefulness in deciding the probability of completion of the project with a simple example. 6

(b) There are seven activities in a project and the time estimates are as follows. The logical of activities are:

1. Activities A and B start at the beginning of the project.
2. When A is completed C and D start.
3. E can start when B and D are finished.
4. F can start when B , C and D are completed and is the final activity.
5. G can start when F is finished and is the final activity.

Draw the network diagram and find the critical path of the project. 6

Activity	Activity time
A	6
B	10
C	3
D	4
E	5
F	10
G	3

OR

Que. 6 Given below are network data and time–cost trade off data for small maintenance work 12

Activity	Immediately preceding activity	Normal		Crash	Cost slope Rs. Per day
		Time in days	Cost in Rs.	Time in days	
A	---	3	50	2	50
B	---	6	140	4	60
C	--	2	50	1	30
D	A	5	100	2	40
E	C	2	55	2	--
F	A	7	115	5	30
G	B, D	4	100	2	70

Assume that the indirect cost including the cost of lost production and associated costs to be as given below:

Project duration in days	12	11	10	9	8	7
Indirect cost in Rs.	900	820	740	700	660	620

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