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B.E/B.Tech. (FT) DEGREE END SEMESTER EXAMINATION APRIL/MAY 2012

INDUSTRIAL ENGINEERING BRANCH

V SEMESTER- (REGULATION 2008)

IE9302 –OPERATIONS RESEARCH-II

13

Answer All Questions

PART 'A' (10 x 2 = 20 Mark)

1. Name different types of inventory.
2. Define lead time.
3. What is buffer stock?
4. Name different ways of classification of inventory materials.
5. What is joking In queuing theory
6. List some application of queuing theory
7. Name different criteria for decision making under uncertainty condition
8. What is pure strategy
9. What is maintenance? List the type of maintenance
10. What is group replacement policy

PART-B (50 X 16 = 20 Marks)

11. Find the optimum order quantity for a product for which the price breaks are as follows

Order Quantity	Unit cost (Rs.)
$0 < Q_1 < 100$	250.00
$100 \leq Q_2 < 200$	200.00
$200 \leq Q_3$	150.00

The monthly demand for the product is 40 units. The storage cost is 10% of the unit cost of the product per month and the cost of ordering is Rs300/month

12 a) Goodwill Manufacturing Company is currently purchasing 9000 units of a product for its annual usage. It is presently ordering one month usage at a time. Each unit costs Rs. 20. The ordering cost per order is Rs. 15 and carrying cost is 15% per annum. Find the optimal purchasing policy for the company. How much does the company save per year?

OR

12 b) (i) What do you mean by ABC analysis? Explain it with example. 6 marks

(ii) A baking company sells one type of cake by weight. It makes a profit of Rs.12 on every kg. of cake sold on the day it is baked. It disposes of all cakes not sold on the date it is baked at a loss of Rs.2.50 per kg. If demand known to be rectangular between 3000 and 4000 kg's. Determine the optimum amount to be baked?

10 marks

13 (a) A self-service grocery store employs one cashier at its counter. Eight customers arrive on an average every 5 minutes while the cashier can serve 10 customers in 5 minutes. Assuming Poisson distribution for arrival and exponential distribution for service rate, find

a) Average number of customers in the system.
b) Average number of customers in queue.
c) Average time a customer spends in the system.
d) Average time a customer waits before being served.

(OR)

13(b) A barber shop has two barbers and three chairs for customers. Assume that the customers arrive in poison fashion at a rate of 5 per hour and that each barber services customers according to an exponential distribution with mean of 15 minutes. Further if a customer arrives and no empty chair in the shop, he will leave. What is the probability that the shop is empty? What is the expected number of customers in the shop?

8 + 8 = 16 marks

14(a) A super Bazaar must decide on the level of supplies it must stock to meet the needs of its customers during Diwali days. The exact number of customers is not known, but it is expected to be in one of the four categories, 300, 350, 400 or 450 customers. Four levels of supplies are thus suggested with level j being ideal (from the view point of incurred costs) if the number of customers falls in category j. Deviations from the ideal levels results in additional costs either because extra suppliers are stocked needlessly or because demand cannot be satisfied. The table below provides these costs in thousands of rupees.

Customer category	Supplier levels			
	A1	A2	A3	A4
E1	7	12	20	27
E2	10	9	10	25
E3	23	20	14	23
E4	32	24	21	17

What is the best alternative under?

(i) Laplace criterion
(ii) Minimax criterion
(iii) Maximum criterion
(iv) Savage criterion 16 marks

(OR)

14 (b) Mr. Ramesh is interested in developing and marketing a new drug. The cost of extensive research to develop the drug woruld be Rs.1,00,000. The manager of the research programme said that there is 60% chance that the drug will be developed successfully. The market potential is assessed as follows with the present value of profits.

Market conditions	Probability	Present value of profits (Rs.)
Large market potential	0.1	5,50,000
Moderate Market potential	0.5	2,40,000
Low market potential	0.4	80,000

The present value figures do not include the cost of research. While Mr,Ramesh considering this proposal, another similar proposal came up which also had required the investment of Rs.1,00,000. The present value of profits for the second proposal was RS. 1,20,000. The return on the investment in the second proposal is almost certain.

a) Draw the decision tree for Mr. Ramesh indicating all choices and events.
b) What decision Mr. Ramesh should take regarding the investment of Rs. 1,00,000?

15.(a) In a game of matching coins with two players, suppose A wins one unit of value when there are two heads, wins nothing when there are two tails and loses 1/2 unit of value when there is one head and one tail. Determine PAY - OFF matrix, the best strategy for each player and the value of the game to A. 16 marks

(OR)

15 (b) The failure rate of 1000 street bulbs in a colony are summarized in the table

Month	1	2	3	4	5	6
Probability of failure date	0.05	0.2	0.4	0.65	0.85	1.00

The cost of replacing an individual bulb is Rs.60. If all the bulbs are replaced simultaneously it would cost Rs.25 per bulbs. Any one of the following two options can be followed to replace the bulbs.

i) Replace the bulbs individually when they fail (individual replacement policy)

ii) Replace all the bulbs simultaneously at fixed intervals and replace the individual bulbs as and when they fail in service during the fixed interval.

Find out the optimal replacement policy? If group replacement policy, then find at what equal intervals should all the bulbs be replaced