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Question Paper Code: 46704

B.E. / B.Tech. DEGREE EXAMINATION, DEC 2020

Sixth Semester

Mechanical Engineering

14UME604 - OPERATIONS RESEARCH

(Regulation 2014)

Duration: 1.15 hrs

Maximum: 30 Marks

PART A - (6 x 1 = 6 Marks)

(Answer any six of the following questions)

- In simplex method, if there is tie between a decision variable and a slack (or surplus) variable, ----- should be selected
 - Slack variable
 - Surplus variable
 - Decision variable
 - None of the above
- In the simplex method, variables that are assigned zero values are called
 - Basic variables
 - Non-basic variables
 - slack variables
 - artificial variables.
- The optimality of a transportation problem is determined by the application of
 - least cost method
 - north west corner method
 - vogel's approximation method
 - modi method
- In a $n \times n$ matrix of an assignment problem, the optimality is reached when the minimum number of straight line scoring all the zero is
 - n^2
 - $1/n$
 - n
 - $n/2$

5. PERT and CPM are
 - (a) techniques to determine project status
 - (b) decision making techniques
 - (c) aids to determine the cost implications of project
 - (d) aids for decision making
6. A dummy activity is used in PERT network to represent
 - (a) Precedence relationship
 - (b) Necessary time delay
 - (c) Resource constrains
 - (d) Idle resource.
7. Expected time to complete an activity is calculated from
 - (a) Optimistic time estimate
 - (b) Most likely time estimate
 - (c) Pessimistic time estimate
 - (d) All of the above.
8. For the equipment that deteriorates in performance over time, the running cost usually
 - (a) Increases with time
 - (b) Decreases with time
 - (c) Remains constant
 - (d) Any of the above.
9. In a zero-sum game
 - (a) What one player wins, the other loses
 - (b) The sum of each player's winning if the game is played many times must be zero
 - (c) The game is fair-each player has an equal chance of winning
 - (d) Long-run profits must be zero.
10. A common assumption about the players in a game is that
 - (a) neither player knows the payoff matrix
 - (b) the players have different information about the payoff matrix
 - (c) only one of the players pursues a rational strategy
 - (d) the specific identity of the players is irrelevant to the play of the game

PART – B (3 x 8= 24 Marks)

(Answer any three of the following questions)

11. Three grades of coal A, B and C contain phosphorous and ash as impurities. In a particular industrial process, fuel up to 100 ton (maximum) is required which should contain ash not more than 3% and phosphorous not more than 0.03%. it is desired to maximize the profit while satisfying these conditions. There is an unlimited power supply of each grade. The percentage of impurities and the profits of grades are given below (8)

Coal	Phosphorous (%)	Ash (%)	Profits in rupees per ton
A	0.02	3.0	12.00
B	0.04	2.0	15.00
C	0.03	5.0	14.00

12. Solve the following assignment problem: (8)

	I	II	III	IV	V
1	11	17	8	16	20
2	9	7	12	6	15
3	13	16	15	12	16
4	21	24	17	28	26
5	14	10	12	11	13

13. A project schedule has the following characteristics: (8)

Activity	Time (weeks)	Activity	Times (weeks)

1 - 2	4	5 - 6	4
1 - 3	1	5 - 7	8
2 - 4	1	6 - 8	1
3 - 4	1	7 - 8	2
3 - 5	6	8 - 10	5
4 - 9	5	9 - 10	7

- (i) Construct the network.
- (ii) Compute E and L for each event, and find the critical path
14. Explain different types of cost in inventory system and also list the models of inventory. (8)
15. The arrival rate of customers at the single window booking counter of a two wheeler agency follows Poisson distribution and service time follows exponential distribution. Hence the service rate also follows Poisson distribution. The arrival rate and the service rate are 25 customers/hr and 35customers/hr respectively. Find the following:
- (i) Utilization of the booking clerk
- (ii) Average number of waiting customers in the queue
- (iii) Average number of waiting customers in the system
- (iv) Average waiting time per customer in the system
- (v) Average waiting time per customer in the system (8)