NN/2024
Reg. No. _____
(To be filled by the candidate)

20MSS41
(2021 BATCH ONWARDS)

COIMBATORE INSTITUTE OF TECHNOLOGY
(Government Aided Autonomous Institution)
COIMBATORE 641 014

M.Sc. SOFTWARE SYSTEMS DEGREE EXAMINATIONS, NOVEMBER 2024
(Fourth Semester)

20MSS41 RESOURCE MANAGEMENT TECHNIQUES

Time : 3 Hours Max:100 marks

INSTRUCTIONS

1. Answer all Questions in Part A and as per choice in Part B
2. Part A and Part B questions should be answered separately in the same answer sheet.

PART – A

(10 x 2 = 20)

	M	BTL	CO
1. Compare the basic and artificial variable, involved in solving a linear programming problem.	2	LO	CO1
2. Compare assignment and transportation problem.	2	LO	CO1
3. List the major assumptions made while dealing with sequencing problems.	2	LO	CO2
4. Write the main purpose of replacement analysis.	2	LO	CO2
5. List the Basic inventory models.	2	LO	CO3
6. Compare Ordering Cost and Carrying Cost.	2	LO	CO3
7. Define utilisation factor in queuing theory.	2	LO	CO4
8. Write the Kendall's notation for identifying a Queue Model with single channel, Poisson arrivals, exponential service, unlimited queue and infinite calling population.	2	LO	CO4
9. List the different types of float involved in network analysis.	2	LO	CO5
10. Write any two differences between PERT and CPM.	2	LO	CO5

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PART-B

(5X16=80)

11. Make use of Revised Simplex (Big M) method to solve.

Max $Z = x_1 + x_2$

subject to

$2x_1 + 5x_2 \leq 6$

$x_1 + x_2 \geq 2$

and $x_1, x_2 \geq 0$. 16 IO CO1

(OR)

12. Five operators have to be assigned to Five Machines. The assignment costs are given in the table below. Determine the assignments that minimizes the cost, using Hungarian algorithm

	Machine				
	I	II	III	IV	V
Operator					
A	5	5	-	2	6
B	7	4	2	3	4
C	9	3	5	-	3
D	7	2	6	7	2
E	6	5	7	9	1

16 IO CO1

13. The cost pattern for two machines A and B, when money value is not considered, is given in the table below.

	Year cost at the beginning of year	
Year	Machine A	Machine B
1	900	1400
2	600	100
3	700	700

Determine the cost pattern for each machine when money is worth 10 percent per year and hence, find which machine is less costly. 16 IO CO2

(OR)

14. There are 1000 bulbs in the system. Survival rate is given below.

Week :	1	2	3	4	5
Percent failing by the end of week :	10	20	40	60	100

Determine the optimal costs under individual replacement policy if the cost of replacement is Rs.5 per bulb. 16 IO CO2

Contd...

15. The following table gives the annual demand and unit price of four items.

Item	: A	B	C	D
Annual demand(Units)	: 800	400	392	13800
Unit Price(Rs.)	: 0.02	1.00	8.00	0.20

Order cost is Rs.5 per order and holding cost is 10 percent of the price.

Determine (i) the EOQ in units.

(ii) the total variable cost.

(iii) the EOQ in year of supply.

(iv) the number of orders per year. 16 IO, CO3

(OR)

16. a) Demand for an item in a company is 18000 unit per year and Company can produce an item at a rate of 3000 per month. A cost of 1 setup is Rs. 500 and the holding cost of 1 unit per month is 15 paise. The shortage cost of 1 unit is Rs. 20 per month. Determine optimum manufacturing Quantity, no of shortages, manufacturing time and time between setups. 8 IO CO3

b) Determine the optimum order quantity for a product with price breaks as follows,

Quantity	Unit/Cost
$0 \leq Q_1 < 500$	10.00
$500 \leq Q_2$	9.25

The monthly demand for the product is 200 units. The holding cost is 2% of the Unit cost and cost of ordering is Rs. 350. 8 IO CO3

17. Customers arrive at one-man barber shop according to a Poisson process with a mean inter arrival time of 12 min. Customers spend an average of 10 min. in the barber's chair.

(i) Calculate the expected number of customers in the barber shop and in the queue.

(ii) Find the percentage of time an arrival can walk straight into the barber's chair without having to wait.

(iii) Calculate the expected time of a customer in the barber shop.

(iv) Management will provide another chair and here another barber, when a customer's waiting time in the shop exceeds 1.25h. Determine the average rate of increase of arrivals to warrant a second barber.

(v) Calculate the expected time of a customer in the queue.

(vi) Calculate the probability that the waiting time of a customer in the system exceeds 30 min.

(vii) Calculate the percentage of customers who have to wait prior to getting Into the barber's chair. 16 IO CO4

(OR)

Contd....

18.(a) A small mail-order business has one telephone line and a facility for call waiting for two additional customers. Orders arrive at the rate of one per minute and each order requires 2 minutes and 30 seconds to take down the particulars. (i) Find the expected number of calls waiting in the queue. (ii) Find the mean waiting time in the queue. 8 IO CO4

(b) Explain in detail the characteristics of a queuing system. 8 IO CO4

19. A project schedule has the following characteristics.

Activity	1-2	1-3	2-4	3-4	3-5	4-9	5-6	5-7	6-8	7-8	8-10	9-10
Time(days)	4	1	1	1	6	5	4	8	1	2	5	7

From the above details,

(1) Construct a network diagram.

(2) Compute the earliest and latest event time

(3) Determine the critical path and total project duration.

(4) Compute the total and free float for each activity. 16 IO CO5

(OR)

20. A project has the following activities and other characteristics:

Activity(i-j)	Estimated Duration (in weeks) Optimistic	Most likely	Pessimistic
1-2	1	1	7
1-3	1	4	7
1-4	2	2	8
2-5	1	1	1
3-5	2	5	14
4-6	2	5	8
5-6	3	6	15

(i) Find the expected project length.

(ii) Determine the probability that the project will be completed no more than 4 weeks later than the expected time. 16 IO CO5