USN ☐☐☐☐☐☐☐☐☐☐ **15ME81**

Eighth Semester B.E. Degree Examination, Aug./Sept.2020
Operation Research

Time: 3 hrs. Max. Marks: 80

Note: *i) For Regular Students: Answer any FIVE full questions irrespective of modules.*
ii) For Arrear Students : Answer any FIVE full questions, choosing ONE full question from each module.
iii) Use of normal distribution table is allowed.

Module-1

1 a. Define operation research and explain all phases of operation research. **(05 Marks)**
   b. Old hens can be brought at Rs.20 each and young one at Rs.50 each. The old hens lay 3 eggs per week and young one lay 5 eggs per week. Each egg being worth of one rupee and thirty paise. A hen cost Rs.4 per week to feed. He has only Rs.800 to spend for hens. How many of each kind should be buy to give a profit of more than Rs.600 per week. Assuming that he cannot handle more than 200 hens, formulate the above problem as LPP model. **(11 Marks)**

2 a. Explain the limitations of operation research. **(05 Marks)**
   b. Solve the below given LPP graphically and find the value of 'Z'.
   $$\text{Minimize } Z = 1.5x_1 + 2.5x_2$$
   $$x_1 + 3x_2 \geq 3$$
   $$x_1 + x_2 \geq 2$$
   $$x_1 \geq 0$$
   (11 Marks)

Module-2

3 a. Solve the below given LPP by Big-M method.
   $$\text{Maximize } Z = -2x_1 - x_2$$
   $$3x_1 + x_2 = 3$$
   $$4x_1 + 3x_2 \geq 6$$
   $$x_1 + 2x_2 \leq 4$$
   $$x_i \geq 0$$
   (11 Marks)
   b. Define slack, surplus and artificial variable. **(05 Marks)**

4 a. Explain how do you resolve degeneracy in simplex method. **(05 Marks)**
   b. Solve the below given LPP by two phase method.
   $$\text{Minimize } Z = \frac{15}{2}x_1 - 3x_2$$
   $$3x_1 - x_2 - x_3 \geq 3$$
   $$x_1 - x_2 + x_3 \geq 2$$
   (11 Marks)

Module-3

5. Solve the following transportation problem and find the minimum transportation cost.

Warehouse → Factory ↓	W_1	W_2	W_3	W_4	Factory Capacity
F_1	19	30	50	10	7
F_2	70	30	40	60	9
F_3	40	8	70	20	18
Warehouse Requirement	5	8	7	14	

(16 Marks)

6. Solve the following assignment problem and find minimum time required to complete all jobs. Time each man would take to perform each task is given in the matrix.

Job → Men ↓	I	II	III	IV
A	8	26	17	11
B	13	28	4	26
C	38	19	18	15
D	19	26	24	10

(16 Marks)

Module-4

7. a. Explain the Fulkerson's rule for number of nodes. **(05 Marks)**

   b. Time estimates in weeks for PERT net work is given below. Calculate the following:
   (i) Total expected time for the critical path
   (ii) Standard deviation and varience for the project
   (iii) Probability of project completion atleast 4 weeks earlier than expected time
   (iv) If the project due date is 19 weeks, what is the probability of not meeting the due date?

Activity	t_o	t_m	t_p
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

(11 Marks)

8. a. Explain the queuing system description parameters. **(05 Marks)**

   b. A TV repairman finds that the time spent on his jobs has an exponential distribution, with mean 30 minutes. If he repairs set in the order in which they come in and if the arrival of sets is approximately Poisson with an average rate of 10/8 hrs day, what is repairman's expected idle time each day. How many jobs are ahead of average set just brought in?

(11 Marks)

Module-5

9 a. Explain maximini and minimaxi principle and also explain characteristics of Game theory.
   (05 Marks)

   b. Solve the following game graphically.

Player 'B'

		a	b	c	d	e
Player 'A'	I	−5	5	0	−1	8
	II	8	−4	−1	6	−5

   (11 Marks)

10 a. Explain the assumptions made while solving sequencing problems.
   (05 Marks)

   b. Find the sequence that minimizes the total elapsed time 'T' required to complete the following tasks. Each task can be processed in any two machines A, B and C in any order.

Tasks

		1	2	3	4	5	6	7
	A	12	6	5	3	5	7	6
Machines	B	7	8	9	8	7	8	3
	C	3	4	11	5	2	8	4

   (11 Marks)

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Eighth Semester B.E. Degree Examination, Aug./Sept.2020
Additive Manufacturing

Time: 3 hrs.   Max. Marks: 80

Note: i) For Regular Students: Answer any FIVE full questions irrespective of modules.
ii) For Arrear Students : Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Explain Additive Manufacturing Process Chain with a neat block diagram. **(06 Marks)**
   b. Explain stereolithography process with a neat sketch. Write its merits, demerits and applications. **(10 Marks)**

2 a. Distinguish between stereolithography and selective laser sintering processes. **(06 Marks)**
   b. Explain with a neat sketch, Fused Deposition Modeling Process. What are its advantages, disadvantages and applications? **(10 Marks)**

Module-2

3 a. Explain the types of D.C. motors with field coils with neat sketches. **(08 Marks)**
   b. Explain briefly with neat diagrams the following:
   (i) Thyristors   (ii) Triacs **(08 Marks)**

4 a. Compare hydraulic and pneumatic systems. **(06 Marks)**
   b. Write a note on shape memory alloys. **(10 Marks)**

Module-3

5 a. Explain with a neat sketch polymer processing by wet spinning. **(08 Marks)**
   b. Explain in detail the liquid phase sintering. **(08 Marks)**

6 a. Explain with a neat sketch Dry Spinning Method for additive manufacturing. **(08 Marks)**
   b. Explain with a neat sketch powder production by vacuum atomization technique. **(08 Marks)**

Module-4

7 a. Explain with a neat sketch the sol-gel process. **(06 Marks)**
   b. Explain the principle of Scanning Electron Microscopy (SEM) with a neat sketch. What are its applications? **(10 Marks)**

8 a. Explain with a neat sketch, flame assisted ultrasonic spray pyrolysis. **(08 Marks)**
   b. Explain with a neat sketch the salient features of Atomic Force Microscopy (AFM). **(08 Marks)**

Module-5

9 a. Write a note on NC, CNC and DNC machine tools. **(06 Marks)**
   b. Explain briefly the various strategies for automation and process improvement. **(10 Marks)**

10 a. Explain with a block diagram the levels of automation. **(10 Marks)**
    b. Distinguish between continuous control in process industries and discrete control in manufacturing industries. **(06 Marks)**

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15ME835

Eighth Semester B.E. Degree Examination, Aug./Sept.2020
Product Lifecycle Management

Time: 3 hrs.

Max. Marks: 80

Note: i) For Regular Students: Answer any FIVE full questions irrespective of modules.
ii) For Arrear Students : Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1	a.	Define PLM. Explain the need for PLM.	(08 Marks)
	b.	Explain the phases of PLM.	(08 Marks)
2	a.	What is Product Data Management? List the advantages of PDM.	(10 Marks)
	b.	Discuss on opportunities of PLM.	(06 Marks)

Module-2

3	a.	Explain product design process with flow chart.	(08 Marks)
	b.	Explain strategies for recovery at end of life.	(08 Marks)
4	a.	Write short notes on : (i) Recycling (ii) Human factors in product design.	(08 Marks)
	b.	What is concurrent engineering? List its advantages and limitations.	(08 Marks)

Module-3

5	a.	What is New Product Development (NPD)? What are the needs and benefits?	(08 Marks)
	b.	Define building decision support system with all components.	(08 Marks)
6	a.	Discuss on implementing new product development.	(08 Marks)
	b.	Explain launching and tracking of new product program.	(08 Marks)

Module-4

7	a.	Define Technological change. Mention methods of technology forecasting.	(08 Marks)
	b.	With an example explain relevance tree technique.	(08 Marks)
8	a.	Write short notes on : (i) Morphological methods (ii) Flow diagram.	(08 Marks)
	b.	What are methods and tools in the innovation process according to situation?	(08 Marks)

Module-5

9	a.	Define Virtual Product Development. Give classification of VPD.	(08 Marks)
	b.	What are methods of analyzing Virtual Product models (VPD).	(08 Marks)
10	a.	Write short note on Process Planning and Control (PPC).	(08 Marks)
	b.	Define Product Configuration Process.	(08 Marks)

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