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Eighth Semester B.E. Degree Examination, July/August 2022 Operations Research

Time: 3 hrs.

Max. Marks: 80

*Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Use of SQL tables is permitted.*

Module-1

- 1 a. List and explain the phases of operations research. (08 Marks)
 b. A manufacturing Company is producing two products A and B. Each of the products A and B requires the use of two machines P and Q. Product A requires 4 hours of processing in Machine P and 3 hours of processing in Machine Q. Product B requires 3 hours of processing on Machine P and 6 hours of Processing on Machine Q. The unit profits of product A and B are Rs.20 and Rs.30 respectively. The available time in a given quarter on Machine P is 1000 hours and on Machine Q is 1200 hours. The market survey has predicted 250 units of product A and 300 units of product B can be consumed in a quarter. The company is interested in deciding the product mix to maximize the profits. Formulate the LPP model of this problem. (08 Marks)

OR

- 2 a. Discuss the applications of Operation research techniques. (08 Marks)
 b. Solve the following LPP using graphical method:
 Maximize $z = 6x_1 + 8x_2$
 Subject to $5x_1 + 10x_2 \leq 60$
 $4x_1 + 4x_2 \leq 40$
 $x_1, x_2 \geq 0$ (08 Marks)

Module-2

- 3 Solve the following LPP by simplex method.
 Maximize $z = 10x_1 + 20x_2$
 Subject to $3x_1 + 2x_2 \leq 1200$
 $2x_1 + 6x_2 \leq 1500$
 $x_1 \leq 350$
 $x_2 \leq 200$
 where $x_1, x_2 \geq 0$ (16 Marks)

OR

- 4 a. Define the following:
 (i) Unbounded solution (ii) Degenerate solution. (iii) Slack variable
 (iv) Surplus variable (v) Basic variable. (10 Marks)
- b. Write the dual of the following LPP:
 Maximize $Z = 4x_1 + 10x_2 + 25x_3$
 Subjected to $2x_1 + 4x_2 + 8x_3 \leq 25$
 $4x_1 + 9x_2 + 8x_3 \leq 30$
 $6x_1 + 8x_2 + 2x_3 \leq 40$
 where x_1, x_2 and $x_3 \geq 0$ (06 Marks)

Module-3

- 5 a. What is balanced and unbalanced transportation problem? How unbalanced transportation problem is converted into balanced transportation problem is converted into balanced Transportation Problem, show with example. (06 Marks)
 b. Find the initial basic feasible solution for Transportation Problem by VAM method. (10 Marks)

		Market					Supply
		1	2	3	4	5	
Plant	1	10	2	16	14	10	300
	2	6	18	12	13	16	500
	3	8	4	14	12	10	825
	4	14	22	20	8	18	375
Demand		350	400	250	150	400	

OR

- 6 a. For the given Transportation Problem with initial basic solution optimize the solution using MODI method. (10 Marks)

		1	2	3	4	Supply
		1	250	50	7	4
2	2	300	100	9	400	
3	8	3	300	200	500	
Demand	250	350	400	200		

- b. Solve the assignment problem and find optimal assignment and total processing time.

		Operator				
		A	B	C	D	E
Job	1	10	12	15	12	8
	2	7	16	14	14	11
	3	13	14	7	9	9
	4	12	10	11	13	10
	5	8	13	15	11	15

Module-4

- 7 Consider the table with details shown below of a project involving 14 activities:

Activity	A	B	C	D	E	F	G	H	I	J	K	L	M	N
Immediate Predecessor	-	-	-	B	A	A	B	C, D	C, D	E	F,G,H	F,G,H	I	J,K
Duration(months)	2	6	4	3	6	8	3	7	2	5	4	3	13	7

- (i) Construct CPM network.
 (ii) Determine critical path and project completion time.
 (iii) Compute time schedules : EST, EFT, LST, LFT and Total floats, Free floats.

(16 Marks)

OR

- 8 a. Briefly describe the characteristics of Queueing system. (06 Marks)
 b. Patients arrive at a hospital reception counter at an average inter arrival rate of 2 min. The receptionist in duty takes an average of one minute per patients.
 (i) What is the chance that patient will straight way meet the receptionist?
 (ii) For what portion of time the receptionist is busy.
 (iii) What is the average queue length?
 (iv) What is the average numbers of patients in the system?
 (v) What is the average waiting time of a patient?
 (vi) What average time a patient spends in system.

(10 Marks)

Module-5

- 9 a. Explain (i) Pay off matrix (ii) MAXIMIN – MINIMAX principle (iii) Saddle point (08 Marks)
- b. Solve the game, for two players A and B are playing a game of tossing a coin simultaneously ; Player A wins 1 unit of value when there are two heads, wins nothing when there are two tails and loses $\frac{1}{2}$ unit of value when there is one head and one tail. Find the pay off matrix, the best strategies for each player and the value of game. (08 Marks)

OR

- 10 a. State the assumptions of sequencing problems. (06 Marks)
- b. A machine operator has to perform three operations turning, threading and knurling on a six jobs in that order. Determine the optimal schedule (sequence), total elapsed time and Idle times for the three machines.

Jobs	Turning machines (min)	Threading machine (min)	Knurling Machine (min)
1	3	8	13
2	12	6	14
3	5	4	9
4	2	6	12
5	9	3	8
6	11	1	13

(10 Marks)

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Eighth Semester B.E. Degree Examination, July/August 2022 Additive Manufacturing

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Explain Additive manufacturing process chain with a neat sketch. (08 Marks)
b. Explain stereolithography process with a neat sketch. (08 Marks)

OR

- 2 a. List out the post processing technique of additive manufacturing parts. Explain any three techniques. (08 Marks)
b. Explain the application of additive manufacturing. (08 Marks)

Module-2

- 3 a. With a neat sketch, explain the working of hydraulic motors.
i) Gear Motor ii) Balanced vane motor. (08 Marks)
b. With Torque – speed curve, explain compound motor. (04 Marks)
c. List advantages and disadvantages of DC motors. (04 Marks)

OR

- 4 Explain briefly with neat diagrams the following : i) Thyristors ii) Triacs iii) Diodes
iv) Shape memory alloy. (16 Marks)

Module-3

- 5 a. List out the polymers used for Additive manufacturing process, with a neat sketch explain polymer processing by wet spinning technique. (08 Marks)
b. Explain with neat sketch compression moulding of polymers. (08 Marks)

OR

- 6 a. Explain the various steps involved in production of a power metallurgy component. (08 Marks)
b. Explain the applications of powder metallurgy components. (08 Marks)

Module-4

- 7 a. Explain with a neat sketch the sol – gel process. (08 Marks)
b. With a neat sketch explain flame assisted ultrasonic spray pyrolysis process. (08 Marks)

OR

- 8 a. Explain with a neat sketch Transmission Electron Microscopy. (08 Marks)
b. With a neat sketch, explain Electron probe Micro Analyzer. List its advantages and disadvantages. (08 Marks)

Module-5

- 9 a. List out the advantages of CNC machines over NC machine. (06 Marks)
b. Explain briefly the various strategies for automation and process improvement. (10 Marks)

OR

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

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Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and/or equations written eg, 42+8 = 50, will be treated as malpractice.

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Eighth Semester B.E. Degree Examination, July/August 2022 Product Life Cycle Management

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Define PLM. List and explain the different phases of Product Life Cycle. (06 Marks)
b. What is PLM Strategy? Explain. (04 Marks)
c. List the benefits of PLM. (06 Marks)

OR

- 2 a. Sketch and explain the PLM has a holistic approach to the management of a product. (06 Marks)
b. List and explain the various opportunities of PLM. (06 Marks)
c. What do you mean by PLM feasibility study? Explain. (04 Marks)

Module-2

- 3 a. With an example, discuss the various steps involved in engineering design. (08 Marks)
b. Discuss the role of concurrent engineering in Product design and development. (08 Marks)

OR

- 4 a. Write short notes on recycling. (06 Marks)
b. What is design for X and design – centered development model? (10 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)

OR

- 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 Technology Forecasting. Explain why technology forecasting is important. (08 Marks)
b. List and explain any one method of Technology Forecasting. (08 Marks)

OR

- 8 a. Sketch and explain the importance of 'Relevance Tree' by taking Automobile as an example. (08 Marks)
b. List and explain the importance of ideation tools in the innovation process. (08 Marks)

Module-5

- 9 a. Explain the use of digital Mock – Up in product development. (06 Marks)
b. Explain the technology involved in solid modeling for building 3D models. (10 Marks)

OR

- 10 a. What is Product data technology? Explain variant management. (08 Marks)
b. Discuss the need and benefits of variant product development. (08 Marks)

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