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P.E.S. College of Engineering, Mandya - 571 401
(An Autonomous Institution affiliated to VTU, Belagavi)
Seventh Semester, B.E. - Industrial and Production Engineering
Semester End Examination; Jan. / Feb. - 2021
Operations Management

Time: 3 hrs

Max. Marks: 100

Note: Answer **FIVE** full questions, selecting **ONE** full question from each unit.

UNIT - I

- 1 a. Explain the classification of production and manufacturing systems. 10
- b. Discuss about the international dimensions of productivity. 5
- c. Define productivity. List the factors affecting productivity. 5
2. Write a note on the following:
- i) Characteristics of decisions ii) Break even analysis 20
- iii) Decision methodology iv) Historical development of operations management

UNIT - II

- 3 a. Differentiate between manufacturing systems and service systems. 5
- b. Explain design capacity strategy. 6
- c. Discuss about the aggregate planning strategies used in the industries. 9
- 4 a. Sales of television sets of a particular brand have been tabulated below:

Year	2012	2013	2014	2015	2016	2017	2018	2019
Sales (Lakhs of Rupees)	15	16	22	24	21	30	31	38

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Using previous year forecast = 25 and $\alpha = 0.01$. Determine the forecast for the year 2020 by exponential smoothing techniques.

- b. The data given below refers to the sales of a helmet manufacturing unit for the last 11 years. 7
- Using least square methods, estimate sales forecast for the next two years.

Year	1	2	3	4	5	6	7	8	9	10	11
Sales Rs (10,000.)	35	50	48	47	53	58	68	79	92	85	96

- c. A manufacturer of children's cycle believes that the demand for the cycles is correlated to the birth of babies in the area during the previous year. Compute the probable sales of cycles in the 9th year given the number of births in the previous year as 1, 66,000.

Year	No. of Births in the Previous Year	Cycles Sold During the Year
1	40,000	3,000
2	48,000	3,200
3	66,000	4,000
4	78,000	5,200
5	92,000	7,900
6	1,05,000	7,900
7	1,25,000	9,000
8	1,40,000	10,000

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UNIT - III

- 5 a. Explain the objectives of master scheduling. 10
- b. A company produces a motor assembly that is used in several hand held appliances. It has 60 units in stock and will manufacture more in production runs (lots) of 90 units. Develop a tentative master schedule for the demand shown in the below table;

Initial Inventory = 60	Week									
	1	2	3	4	5	6	7	8	9	10
Customer Forecast	-	5	30	40	50	40	50	50	50	50
Interplant Forecast	-	-	5	-	-	5	-	-	5	-
Customer Orders	40	40	30	10	10	5	-	-	-	-
Warehouse Orders	15	10	-	5	-	-	-	-	-	-

- c. Explain master scheduling with a suitable example. 5
- 6 a. Define MRP. Explain MRP system parameters. 12
- b. Explain the steps in capacity management process. 8

UNIT - IV

- 7 a. Explain the various scheduling strategies used by the organization. 10
- b. State and explain the three main criteria used to evaluate the effectiveness of priority control activities. 5
- c. Explain the factors affecting capacity control. 5
- 8 a. The below table gives details of single machine scheduling with weights,

Job (j)	1	2	3	4	5
Processing time (t_j)	15	18	12	8	10
weight (W_j)	1	2	4	2	5

Determine; i) WSPT sequence ii) Weight mean Flow Time

- b. A painting contractor is under contract to carry out 6 projects, all with deadlines given in days from now. The contractor has only one team of workers who will carry out projects one after the other. The contractor's stands to gain Rs. 30,000 for each project completed on time but will incur Rs. 40,000 loss for each project delayed whatever may be the duration. The table below gives the duration and due dates for all projects. Compute the best sequence to minimize late jobs so as to maximize net revenues. 8

Project	1	2	3	4	5	6
Duration (t_j)	6	4	8	12	2	10
Due date (d_j)	30	12	19	18	6	12

c. The below table gives details of single machine scheduling with independent jobs.

Job (j)	1	2	3	4	5	6	7	8
Processing Time (t_j)	5	12	8	10	3	15	8	6
Due Date (d_j)	10	16	11	16	6	25	12	14
Weight (W_j)	2	1	1	1	3	4	2	3

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Obtain the optimal sequence for each of the following performance measures:

- i) To minimize the maximum lateness
- ii) To minimize weighted mean flow time
- iii) To minimize mean flow time

Also calculate Lateness Value, Weighted Mean Flow Time and Mean Flow Time.

UNIT - V

9 a. Find the sequence for the following 8 jobs that minimizes the total elapsed time for completion of all jobs, each job being processed in the order CAB. Find the total elapsed time and idle time of each machine.

Machines	Jobs	1	2	3	4	5	6	7	8
	A	4	6	7	4	5	3	6	2
	B	8	10	7	8	11	8	9	13
	C	5	6	2	3	4	9	15	11

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b. The Time spent in min for processing of two jobs on 6 machines A, B, C, D, E and F and the necessary technological ordering of machines are as follows:

		Machines					
Job 1	Sequence	A	C	D	B	E	F
	Time	20	10	10	30	25	15
Job 2	Sequence	A	C	E	D	F	B
	Time	10	10	15	10	15	20

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Use graphical method to determine an optimal sequence of jobs which minimizes the total elapsed time. Also determine which job is done first on each of the machines.

10 a. Five jobs are to be processed on 3 machines M_1 , M_2 and M_3 . The processing time are given below in hours:

Job	1	2	3	4	5
M_1	5	1	9	3	10
M_2	2	6	7	8	4
M_3	9	10	8	11	9

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Determine the Optimum Schedule and Idle time of Each Machine.

b. Discuss about the following:

- i) Automated Guided Vehicle Systems
- ii) Analysis of Material Handling Systems

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