Bachelor of Engineering in Mechanical Engineering Examination – 2018
(3rd Year, 2nd Semester) Subject: **Industrial Management**
Time : Three hours **Full Marks: 100**
Different parts of the same question should be answered together.

A. Answer any one from (1) and (2) from in this block :

1) a) Contribution of Taylor in Modern Scientific Management. 1. b) Critically analyze matrix type Organization. c) Discuss : Bath Tub Curve, RSFE, and MAD.
[7+7+2+2+2 =20]

2. a) Critically analyze "Span of Control". 2. b) The structure of an organization can influence the flow of information through it. Explain two effects that the structure of an organization could have on the flow of information. c) Develop the Cause and Effect Diagram for the problem, "The taper turning of a pin on lathe is not giving the right taper angle of the product".

[4+10+6 =20]

B. Answer any one from (1) and (2) in this block **[5+ 15]**

1) a) Discuss : Flexible Manufacturing System, Delphi Method In Forecasting.

b) In past ten weeks, sales of Gear Boxes of M/s XYZ Gears Ltd. have been as follows:

Week	Sales	Week	Sales	Week	Sales	Week	Sales
1	110	4	120	7	130	10	130
2	115	5	125	8	115		
3	125	6	120	9	110		

What are the common smoothing methods in forecasting? b) Use a 3 period weighted moving average to forecast the sales for week 11 giving a weight of 0.6 to the most recent period, 0.3 to the second most recent period, and 0.1 to the third most recent period. c) Mention the salient features of scientific management.
2. a) Show the basic structure of Queue. b) Derive the following relation with M/M/1:(∞/FCFS) queuing model.

$P_n = \rho^n(1-\rho)$, Symbols have their usual meanings

C. Answer any one from (1) and (2) in this block **[20]**

1. a) Prepare the network of the following project of car purchase using AON,
b) find Critical Path and,
c) tabulate the ES, EF, LS, LF and slack.
d) Show with sketch different types of plant layout. **[7+2+6+5]**

ACTIVITY	DESCRIPTION OF ACTIVITY	IMMEDIATE PREDECESSOR	DURATION IN DAYS
A	Conduct feasibility study	No	3
B	Find potential customer for existing car	A	14
C	List possible models	A	1
D	Research all possible models	C	3
E	Conduct interviews with mechanics	C	1
F	Collect dealer propaganda	C	2
G	Compile and organise all pertinent information	D, E, F	1
H	Choose top three models	G	1
I	Test drive all three choices	H	3
J	Gather warranty and financing information	H	2
K	Choose one car	I, J	2
L	Compare dealers and choose dealer	K	2
M	Select colour and goodies options	L	4
N	Test drive first choice again-CHECK IMPRESSIONS	L	1
O	Purchase new car	B, M, N	3

2) (a) What do you mean by control chart? Explain its need. **[(2+3) + 5+ 10]**

(b) Describe 'Quality Costs'.

(c) The number of weekly customer complaints are monitored in a large hotel are mentioned as follows. Based on the following data in the table, develop a suitable control chart

Week	No. of Complaints		Week	No. of Complaints
1	3		6	3
2	2		7	2
3	3		8	1
4	1		9	3
5	3		10	1

D. Answer any TWO from (1), (2) and (3) from this block **[10+10]**

1) For the purchase of Laptop having annual demand of 6000 units, the ordering cost is USD 60 per unit, the holding cost is USD 10 per unit per year, the interest charge of 10% of the purchase price per unit per year- both based on average inventory level. The purchase price per unit of Laptop is USD 500. Determine the Economic Ordering Quantity. Deduce the formula used separately, mentioning all the assumptions.

2) Solve the following LP problems graphically with necessary comments about the solution(s). Use graph paper.

i) Maximize $Z = 2x_1 + 6X_2$, Subject to,

$\mathbf{4X_1 + 3X_2 \leq 12;\quad 2X_1 + X_2 \geq 8}$

$\mathbf{X_1 \geq 0 \text{ and } X_2 \geq 0}$

ii) Maximize $Z = 3x_1 + 5X_2$, Subject to,

$\mathbf{2X_1 + X_2 \geq 7;\quad X_1 + X_2 \geq 6\ ;\quad X_1 + 3X_2 \geq 9}$

$\mathbf{X_1 \geq 0 \text{ and } X_2 \geq 0}$

3) The machine shop supplies a particular item J to the assembly shop. The annual demand of the item J in assembly shop is 1,00000 units. Production rate in the machine shop is 500 units per day. Set up cost are Rs. 25 per production run. The item is valued at Rs. 2 per unit when it comes off the production line. Complete carrying cost for the production items are set at 12.5% of the p[roduction cost and are based on average inventory. Assume 250 working days in a year. Find the Economic Production Quantity (EPQ) of production runs per year and maximum inventory level. (EPQ formula may be used without deduction).

E. Answer any TWO from (1), (2) and (3) from this block : [10 +10]

1. Prepare a risk assessment document considering the requirements based on IS0 9001 : 2015 standard for a gear manufacturing business unit.
2. Analyse using FMEA format for the operations involved in making a Mild Steel pin on lathe having straight and taper turning, grooving, knurling and thread cutting operations.
3. A mechanical engineer wants to begin a start-up to produce bulb. He is interested to estimate the mean life of the bulb, which is available in the market. In this context, two hundred bulbs are procured from the market and subjected to a reliability test. The bulbs are observed and the failures in 1000-hour intervals are recorded as shown in the following Table :

Table: Number of Failures in the Time Intervals

Time Intervals (Hours)	Failures in the Interval
1-1000	120
1001-2000	80
2001-3000	50
3001-4000	25
4001-5000	15
5001-6000	8
6001-7000	2
Total	**300**

Estimate reliability and hazard rate at different time periods.