

## UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, December 2017

Program: B.Tech Mechanical  
Subject (Course): Industrial Engineering  
Course Code: IMGT 304  
No. of page/s: 3

Semester– V  
Max. Marks: 100  
Duration: 3 Hrs

### SECTION A [20 Marks]

*Note: Attempt all questions. All question carry equal marks. Be brief and specific.*

**Q1:** Differentiate between Job evaluation and Merit rating.

**Q2:** For a particular product, the following information is given:

Selling price per unit: Rs. 100      Variable cost per unit: Rs. 60      Fixed costs: Rs. 10, 00,000

Due to inflation the variable costs have increased by 10% while fixed costs have increased by 5%. If the break-even quantity is to remain constant by what percentage should the Sales price be raised?

**Q3:** Write down the important elements of Supply chain management and their constituent parts.

**Q4:** Name and draw the symbols of any five Therbligs.

### SECTION B [40 Marks]

*Note: Attempt all questions. All question carry equal marks. Be brief and specific.*

**Q5:** Discuss any ten Principles of organization.

**Q6:** The actual tabulated demands for an item for a nine month period (January through September). The supervisor wants to test forecasting methods to see which method was better over the period. Determine:

Month	Actual demand	Month	Actual demand
January	110	June	180
February	130	July	140
March	150	August	130
April	170	September	140
May	160		

- (a) Forecast April through September using a three month moving average.
- (b) Use simple exponential smoothing with  $\alpha = 0.3$  to estimate April through September.
- (c) Use MAD to decide which method produced the better forecast over the six month period.

**Q7:** Briefly explain the Maintenance management along with various types of maintenance.

**Q8:** A lumber yard is open 6 days per week (300 days per year) and sells 3,600 sheets of plywood per year. Order lead time is one week. Inventory holding cost is \$2. The cost of placing an order is \$30.

- (a) Find the economic order quantity.
- (b) Find the annual cost of placing orders and holding inventory for the economic order quantity.
- (c) If the economic order quantity is used, how many orders will be placed per year?
- (d) If the economic order quantity is used, what will the average inventory be?
- (e) Find the reorder point, if no safety stock is kept.

**Or**

Assume that our firm produces type C fire extinguishers. We make 30,000 of these fire extinguishers per year. Each extinguisher requires one handle (assume a 300 day work year for daily usage rate purposes). Assume an annual carrying cost of \$1.50 per handle; production setup cost of \$150, and a daily production rate of 300.

- (a) What is the optimal production order quantity? **(2 marks)**
- (b) Determine (1)  $I_{\max}$  (2) Average Inventory (3) number of batches per year (4) Cycle time  
(5) Annual total cost. **(6 marks)**
- (c) Find the reorder point, if no safety stock is kept. **(2 marks)**

### **SECTION C [40 Marks]**

*Note: Attempt all questions. All question carry equal marks. Be brief and specific.*

**Q9:** (a) Explain Production Planning and control in detail along with its parts. **(15 marks)**

- (b) What are objectives and functions of Materials Handling? **(5 marks)**

**Q10:** A soft drink bottling company is interested in controlling its filling operation. Random Samples of size 4 are selected and the fill weight is recorded. Table shows the data for 24

samples. The specifications on fill weight are  $350 \pm 5$  grams (g). Daily production rate is 20,000 bottles.

(a) Find the trial control limits for the  $\bar{X}$ -bar and R-bar charts. Draw the control charts as well.

(b) Assuming special causes for out-of-control points, find the revised control limits.

Data: For sample size of 4 the different constant values are  $A_2 = 0.729$ ,  $D_3 = 0$ ,  $D_4 = 2.282$

Sample	Observations (g)				Sample	Observations (g)			
1	352	348	350	351	13	352	350	351	348
2	351	352	351	350	14	356	351	349	352
3	351	346	342	350	15	353	348	351	350
4	349	353	352	352	16	353	354	350	352
5	351	350	351	351	17	351	348	347	348
6	353	351	346	346	18	353	352	346	352
7	348	344	350	347	19	346	348	347	349
8	350	349	351	346	20	351	348	347	346
9	344	345	346	349	21	348	352	351	352
10	349	350	352	352	22	356	351	350	350
11	353	352	354	356	23	352	348	347	349
12	348	353	346	351	24	348	353	351	352

Or

The number of processing errors per 100 purchase orders is monitored by a company with the objective of eliminating such errors totally. Table below shows samples that were selected randomly from all purchase orders. The company is in the process of testing the effects of a new purchase order form that it has designed. The last five samples were made using the new form. Construct a control chart that the company can use for monitoring the quality characteristic selected. Also find the revised control limits if any. What is the effect of the newly designed purchase order form?

Sample	Processing Errors	Sample	Processing Errors
1	6	14	3
2	4	15	6
3	2	16	1
4	3	17	5
5	4	18	2
6	7	19	6
7	5	20	4
8	7	21	2
9	11	22	3
10	4	23	2
11	2	24	1
12	5	25	2
13	4		