



**PRESIDENCY UNIVERSITY
BENGALURU**

SCHOOL OF ENGINEERING

MAKEUP EXAMINATION- JAN 2023

Course Code: MEC311

Course Name: Industrial Engineering Techniques

Program : B.Tech MECH

Date: 23-Jan-2023

Time: 09:30 AM to 12:30 PM

Max Marks: 100

Weightage: 50%

Instructions:

- (i) Read the all questions carefully and answer accordingly.
- (ii) Use of normal distribution table is permitted.
- (iii) Use of control chart constants are permitted.

Part A [Memory Recall Questions]

Answer all the Questions. Each question carries TWO marks.

(10Qx 2M= 20M)

1. Mention any of the metric to measure Forecast Accuracy. (C.O.1) [Knowledge]
2. What do mean by lead time in inventory control study? (C.O.1) [Knowledge]
3. Drink served at a cafe should be between 65°C and 76°C when it is delivered to the customer. The process used to keep the food at the correct temperature has a process standard deviation of 2°C and the mean value for these temperatures is 70°C. What is the process capability C_p ? (C.O 2) [Knowledge]
4. How do we calculate UCL and LCL for X bar R chart? (C.O.2) [Knowledge]
5. What is the purpose of fish bone diagram? (C.O.2) [Knowledge]
6. What is the Expected time of the activity A, when Optimistic time = 1 day, Pessimistic time = 7 days and most likely time = 4 days? (C.O.3) [Knowledge]
7. What is an activity and node in project management? (C.O.3) [Knowledge]
8. When R charts are used? (C.O.3) [Knowledge]
9. What is meant by Depreciation? (C.O.4) [Knowledge]
10. Give example for direct and indirect expenses. (C.O.4) [Knowledge]

Part B [Thought Provoking Questions]

Answer all the Questions. Each question carries TEN marks.

(5Qx10M=50M)

11. A University bookstore must order books two months before each semester starts. They believe that the number of books that will ultimately be sold for any particular course is related to the number of students registered for the course when the books are ordered. They would like to develop a linear regression equation to help plan how many books to order. From past records, the bookstore obtains the number of students registered, X, and the number of books actually sold for a course, Y, for 8 different semesters. These data are below.

Students	36	28	35	39	30	31	29	26	34
Books	31	29	34	39	29	30	26	24	32

- a) Find the least square regression line $Y = A X + B$.
- b) Use the least squares regression line as a model to estimate the sales of book for 40 students. (C.O 1) [Application]
12. Fishbone diagram or cause and effect analysis tool is considered one of the seven basic quality tools. It identifies many possible causes for an effect or problem. It can be used to structure a brainstorming session. It immediately sorts ideas into useful categories. Perform the Fishbone analysis for improving hygiene (Effect) taking into consideration various reasons (Causes) for the same and depict them in the diagram. (C.O.2) [Comprehension]
13. A histogram graph is a bar graph representation of data. It is a representation of a range of outcomes into columns formation along the x-axis. In the same histogram, the number count or multiple occurrences in the data for each column is represented by the y-axis. It is the easiest manner that can be used to visualize data distributions. An open elective has 18 students registered for it. Each student has obtained different marks. The marks of the students are given: 11, 13, 21, 8, 13, 17, 14, 8, 14, 36, 15, 17, 19, 16, 14, 17, 14 and 15. Plot the histogram for the given data set. (C.O.2) [Application]
14. A project has the following times schedule.

Activity	Times in weeks
1-2	2
1-3	2
1-4	1
2-6	4
3-7	5
3-5	8
4-5	3
5-9	5
6-8	1
7-8	4
8-9	3

- a.) Draw the network diagram and determine the critical path.

- b.) Determine the early start and late start in respect of all node points and float for each activity. (C.O.3) [Application]

15. Fixed costs of an enterprise is Rs. 2,50,000 and the variable cost and the selling price of the product is Rs. 30 per unit and Rs. 50 per unit respectively. The company expects to sell 13,500 units of the product. Draw a break-even chart depicting the break-even point and determine the profit earned at this current situation and the margin of safety. Calculate the number of products the company needs to sell to make a profit of 25,000. Determine the angle of incidence. (C.O 4) [Application]

Part C [Problem Solving Questions]

Answer all the Questions. Each question carries FIFTEEN marks. (2Qx15M=30M)

16. A small project is composed of 7 activities whose time estimates are listed below.

Activities	Time in weeks		
	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

- a.) Draw the network diagram and find the expected project completion time.
 b.) Calculate the variance and standard deviation for the project.
 c.) Calculate the probability that the project will be completed at least 3 weeks than expected.
 d.) If the project due date is 18 weeks, what is the probability of not meeting the due date? (C.O.3) [Application]

17. Unique Marbles purchased a Machine for ₹ 2,80,000 and spent ₹ 10,000 on its carriage and ₹ 10,000 on its installation. It is estimated that its working life is 6 years and its scrap value will be ₹ 20,000. Calculate the depreciation rate every year by setting up a schedule using straight line method and sum of the digits method. Also plot the depreciation expense over time for each of the two types. (C.O.4) [Application]