Indian Statistical Institute Bangalore

Statistical Quality Control & Operation Research Unit

MS (QMS) First Year [Batch 2025-2026]

First Semester - **Total Quality Management**

Final Exam — Date: 18th November 2025

Maximum Marks: 60 — Duration: 3 hours

1. Say **True or False (any two)** with justification:- **[2 x 2.5 = 5]**

a. Assured quality is necessary for building customer confidence.
b. Preventing the root causes from occurrence is corrective action.
c. Risk Priority Number (RPN) is the sum of severity, occurrence and detection scores.

2. Answer **(any four but 2a is compulsory)** in detail:- **[4 x 10 = 40]**

a. A cafeteria trusts that item price and service time are the important factors that attract and retain customers. Based on the prices of identical items in neighboring cafeterias, it is estimated that the customer tolerance limit for price is $8, and the associated customer loss is estimated to be $50. Similarly, the customer tolerance limit for the service time is 8 minutes for which the associated customer loss is $35. A random sample of size 10, yields the following values of price: 7.20, 8.20, 7.00, 8.50, 5.60, 6.20, 7.80, 6.60, 7.50, 8.10. The sample service times (in minutes) are 6.2, 6.5, 7.8, 11.4, 9.7, 10.5, 8.2, 11.0, 12.0, 8.5. Find the total expected loss per customer. If the cafeteria expects 1500 customers monthly, what is the average monthly loss?. Further, the cafeteria is considering adding extra employees to reduce serving times. However, the additional cost of adding workers is expected to be $0.75 per customer. The results of sampling with the added personnel yield the following waiting times (in minutes): 8.4, 5.6, 7.8, 6.8, 8.5, 6.2, 6.5, 5.9, 6.4, 7.5. Is it cost-effective to add personnel? What is the total average monthly loss?

b. Define FMEA. Explain the various stages of FMEA with the help of a suitable case study.

c. Define Lean. Discuss the roles to be played by the employees for an effective implementation of 5S.

d. Define quality management system (QMS) standards. Explain the requirements of ISO: 14000 & FS22000 and highlight their benefits.

e. State the importance of QC tools and discuss any two of them in detail with a suitable example.

3. Write in **detail note** (with example) on the following. **(Any three) [3 x 5 = 15]**

a. QFD
b. FTA
c. Cause and Effect Diagram
d. VOC

----------**Best off Luck**----------