

**BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION)**

**CLASS: IMSC
BRANCH: MATHS**

**SEMESTER: VI
SESSION: SP/2023**

SUBJECT: MA316 STATISTICAL QUALITY CONTROL AND RELIABILITY

TIME: 2 HOURS

FULL MARKS: 25

INSTRUCTIONS:

1. The question paper contains 5 questions each of 5 marks and total 25 marks.
 2. Attempt all questions.
 3. The missing data, if any, may be assumed suitably.
 4. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates
-

			CO	BL
Q1	(a) Mention two differences between chance and assignable causes of variation.	[2]	1	1.23
Q1	(b) Define quality and explain the four M's to be considered for it.	[3]	1	1.12
Q2	(a) Explain the role of Chebyshev's inequality in statistical quality control.	[2]	1	1.12
Q2	(b) How is process control different from product control?	[3]	1	1.23
Q3	(a) What is a control chart? Mention any two features of a control chart.	[2]	1	1.12
Q3	(b) Suppose you have joined an industry which has just started. You want to propose to your manager that it is worth having a statistical quality control unit. Mention three strong points to justify your proposal.	[3]	1	1.20
Q4	(a) Why is Mean chart useful? Obtain the control limits for Mean chart when (i) standard is specified (ii) standard is not specified.	[2]	2	1.24
Q4	(b) From the following data obtain the control limits for Mean chart and comment on the state of control (given lot size =5; $d_2=2.326$). Lot no: 1 2 3 4 5 6 7 8 9 10 Mean: 48 49 37 44 45 37 51 46 43 47 Range: 5 6 5 7 7 4 8 6 4 6	[3]	2	1.25
Q5	(a) How is process dispersion controlled?	[2]	2	1.24
Q5	(b) From the following data on fuses, can we say the process dispersion is under control? Justify your answer through a suitable control chart (given for lot size =5, $D_3=0$; $D_4=2.11$). Lot 1: 42 65 75 78 87 Lot 2: 42 45 68 72 90 Lot 3: 19 24 80 81 81 Lot 4: 36 54 69 77 84	[3]	2	1.25

:24/02/2023:M