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Name of Examination : **Summer 2021** - (Preview)

Course Code & Course Name : **ME352 - Metrology and Quality control**

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Maximum Marks : **60**

Duration : **3 Hrs**

[Edit](#) [Print](#) [View Answer Key](#) [Close](#) **Answer Key Submission Type:** Marking scheme with model answers and solutions of numerical

Instructions:

1. All questions are compulsory.
2. Illustrate your answer with suitable figures/sketches wherever necessary.
3. Assume suitable additional data; if required.
4. Use of logarithmic table, drawing instruments and non programmable calculators is allowed.
5. Figures to the right indicate full marks.

1) Attempt All from following Sub-Questions.

- a) How are Slip Gauges manufactured? What care is to taken for Slip Gauges? [6]
- b) Define the following [6]
 1. Metrology
 2. Legal Metrology
 3. Dynamic Metrology

2) Attempt any Two from following Sub-Questions.

- a) Compare a Vernier Calliper and Micrometer with reference to i) Robustness ii) ease of reading iii) adaptability iv) protection from dirt and accidental damages v) adjustment for wear vi) accuracy [6]
- b) A slip Gauge set with 87 pieces, as under is available. [6]

Range	Steps (mm)	No. of Blocks
1.001 - 1.009	0.001	9
1.01 - 1.49	0.01	49
0.5 - 9.5	0.5	19
10 - 90	10	9
1.005	-	1

Build up the following dimensions with minimum number of slip gauges (i) 29.578 mm; (ii) 46.635.

- c) What is the Solex Pneumatic Gauge? discuss in detail. Also draw the neat Principle diagram of Solex Pneumatic Gauge. [6]

3) Attempt any Two from following Sub-Questions.

- a) Design the general type of Go & No-GO gauge for component having $20H_7f_8$ fit . [6]

Given

 - (i) $i(\text{micron}) = 0.45 (D)^{1/3} + 0.001D$.
 - (ii) upper deviation of shaft ' f ' = $-5.5 D^{0.41}$.
 - (iii) 20 mm falls in the diameter of step of 18 mm to 30 mm.
 - (iv) $IT7 = 16i$
 - (v) $IT8 = 25i$
 - (vi) Wear allowance 10% of gauge tolerance.

- b) Write short notes on [6]
 - (i) CMM
 - (ii) Tomlinson Surface Meter
 - (iii) Hundred % inspection Vs Sampling Inspection

- c) What are the different types of pitch errors, which may occur on threaded component? [6]

4) Attempt any Two from following Sub-Questions.

- a) Describe with the sketch ' Parkinson Gear tester'. State its importance in gear measurement. [6]
- b) Explain the following terms [6]
 - (i) Quality Control
 - (ii) Quality Design
 - (iii) Quality Conformance

- c) Write a short note on P - chart [6]

5) Attempt All from following Sub-Questions.

- a) Give the steps required to construct the \bar{X} chart and R charts. [6]

- b) In automobile filling process, 500 gms. of certain liquid was to be filled in bags. The permissible variation is ± 5 gms. For investigating the process capability, 05 bags were taken at random each batch for successive batches and results were plotted as follows: [6]

Batch	1	2	3	4	5	6	7	8	9	10
Mean in gms.	501	498	500	503	501	500	497	502	503	496
Range	3	4	2	4	3	5	4	2	6	4

Establish Control chart limit for \bar{X} and R charts. Plot the charts and interpret the meaning. Take $A_2 = 0.58$, $D_3 = 0$, $D_4 = 2.11$. Will process be able to meet the specifications?

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