Total No. of printed pages = 4 09/01/23 ME 181505 Roll No. of candidate BINA CHOWDLIL Azara, Halkhowapara, 2022 B.Tech. 5th Semester End-Term Examination ME, IPE ENGINEERING INSPECTION AND METROLOGY (New Regulation & New Syllabus) Full Marks - 70 Time - Three hours The figures in the margin indicate full marks for the questions. Answer question No. 1 and any four from the rest. Choose the correct answer: 1. $(10 \times 1 = 10)$ A public institution for standardizing and verifying instruments, testing materials, and determining physical constants is called: BPL (a) (b) IPL (c) NPL (d) NMI (ii) Which of the following is a valid statement about 'sampling'? (a) Inspection of samples before starting Production (b) Division of large production into smaller lots (c) Inspection of 10% of manufactured parts (d) A representative portion of a group that is representative of the group (iii) According to Taylor's principle, GO gauges are designed to check Maximum metal condition (a) (b) Minimum metal condition Both of these (c) None of these

Turn over

(d)

(iv)	Inc	ase of fringes, the dark areas will occur		
(11)	(a)	When there is no path difference between two light rays		
	(b)	When the path difference of two light rays from the same source amounts to an even number of half wavelengths		
	(c)	When the path difference of two light rays from the same source amounts to an odd number of half wavelengths		
	(d)	None of these		
(v)	Outside micrometer is calibrated with the help of			
	(a)	Inside micrometer (b) Depth micrometer		
	(c)	Ring gauges (d) Slip gauges		
(vi)	Which one of the instrument is a comparator			
	(a)	Tool makers microscope (b) GO/NOGO gauge		
	(c)	Optical interferometer (d) Dial gauge		
(vii)	An autocollimator is used to			
	(a)	Measure small angular displacements on flat surfaces		
	(b)	Compare known and unknown dimensions		
	(c)	Measure the flatness error		
	(d)	Measure roundness error between enters		
(viii)	V-b	locks are used BINA CHOWOHURY CENTRAL LIBRARY		
	(a)	to test the flatness of a surface (GIMT & GIPS) Azara, Halkhowapara,		
	(b)	to hold cylindrical pieces Guwahati -781017		
	(c)	to hold triangular pieces		
	(d)	to measure the roundness of a surface		
(ix)	Surface roughness on a drawing is represented by			
V) 31	(a)	Circle (b) Triangles		
	2.1	C (IN NI CII		

(c) Square

(d) None of these

(x) Which of the following instruments is used for conducting alignment tests?

(a) Strain gauge

(b) Dial gauge

(c) Dynamometer

(d) Tachometer

2. (a) Three 200 mm gauges to be calibrated are measured on a level comparator by wringing them together and then comparing them with a 600 mm gauge, The 600 mm gauge has an actual length of 600.0025 mm, and the three gauges together have a combined length of 600.0035 mm. When the three gauges are intercompared, it is found that gauge A is longer than gauge B by 0.0020 mm but shorter than gauge C by 0.001 mm.

Show the arrangement and determine the length of each gauge.

(2+1.5+1.5=5)

Distinguish between primary, secondary, tertiary, and working standards. (b) What is inspection? Analyse the economic model for justification of (c) (1+2=3)inspection? (d) The following are the X and R values of 4 subgroups of 5 readings \overline{X} = 10.2, 12. 1, 10.8 and 10.5 R = 1.1, 1.3, 0.9 and 0.8The specification limits for the components are 10.7 ± 0.2 Calculate to identify the control limits for \overline{X} bar and R chart. Decide whether the product be able to meet its specifications? A2 (Factor of \overline{X} chart) = 0.85, D4 (Factor of R chart) = 2.11 and (2+2=4)D3 (Factor of R chart) = 0.00. Tolerances for a hole and shaft assembly having a nominal size of 50 mm 3. (a) are as follows: Hole = $50^{+0.02}_{+0.00}$ mm and shaft = $50^{-0.05}_{-0.08}$ mm Determine the following: Maximum and minimum clearances Azara, Haikhowanera, (ii) Tolerances on shaft and hole (iii) Allowance (iv) MML of hole and shaft (6+1=7)Type of fit. (v) Illustrate with neat sketch the essential conditions for Clearance fit (i) (3 + 3 = 6)(ii) Interference fit Demonstrate the difference between tolerance and allowance (c) (1+1=2)(a) Explain clearly what is meant by interference of light. How does the nature of light source affect interference phenomenon. (2+3=5)(b) Explain the method of checking the height of a component with the help of (2+2+2=6)an optical flat. In the measurement of surface roughness, height of 10 successive peaks and valleys measured from a datum are as follows 45, 25, 40, 25, 35, 16, 40, 22, 25, 34 The measurements were made of 10 mm, determine C.L.A and RMS value (2+2=4)of the surface.

5.	(a)	Describe with diagram how the three wire method used in measurement of screw.
	(b)	Calculate the effective diameter if:
		(i) The micrometer reading with two wires of standard cylinder 15.64 mm
		(ii) Micrometer reading over the gauge with two wires as 15.26 mm and pitch of thread 2.5 mm.
		(iii) Wires of 2.00 mm diameter and standard cylinder 18 mm.
	(c)	What is sine bar? How it is used for angle measurement? $(1 + 2 = 3)$
6.	(a)	Explain the measurement of gear tooth thickness by Chordal Thickness Method.
	(b)	Describe the working principle of Parkinson Gear Tester. (3
	(c)	Calculate the chord length and its distance below the tooth tip for a gear of module 3 and 20° pressure angle. BINA CHOWDHURY CENTRAL LIBRARY (3)
7.	(a)	Discuss the uses of the following: Azarg, Markhowapara, Guwahati -781017
		(i) Slip gauges (ii) Profile Projector (3)
	(b)	How a Co-ordinate Measuring Machine (CMM) helps over a conventional measuring instrument? (4)
	(c)	How the following tests would be carried out on a centre lathe: (2+2=4)
		(i) The straightness of the bed, horizontally and vertically
		(ii) The spindle axis parallel to the bed in horizontal plane.
	(d)	Describe the working principle of Laser Alignment Testing. (4)