BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: BE **SEMESTER : IV**
BRANCH: PRODUCTION **SESSION : SP/17**

SUBJECT: PE4003-METROLOGY

TIME: 03:00 **FULL MARKS: 60**

INSTRUCTIONS:
1. The question paper contains 7 questions each of 12 marks and total 84 marks.
2. Candidates may attempt any 5 questions maximum of 60 marks.
3. The missing data, if any, may be assumed suitably.
***4*. Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.
6. Nothing should be written on front or back of the question paper except tick marking.

Q.1	(a)	Why standards of measurement are required?	[2]
	(b)	Explain 'transposition method', 'complementary method', 'composite method' and 'null method' of measurement with example.	[4]
	(c)	Define 'airy point'. Calculate the distance between the two supports of an end bar of 1000 mm. length considering (i) minimum central deflection (ii) airy point. Further, estimate the position of the support from the end of the end bar in both the cases.	[6]
Q.2	(a)	State the utility of differential gauge unit.	[2]
	(b)	What are the essential characteristics of a good comparator?	[4]
	(c)	With suitable diagram, explain the working of a back-pressure type pneumatic comparator.	[6]
Q.3	(a)	Define and classify 'interchangeability' in manufacturing assembly.	[2]
	(b)	With suitable diagram, explain 'maximum material condition' and 'least material condition' in limit system.	[4]
	(c)	Design limit gauges to inspect the components of the fit 40H7/p6, providing gauge tolerance and wear allowance. Given IT7=16i, IT6=10i and $i=0.45(D^{1/3})+0.001D$. 40 mm diameter is in the range of 30 and 50 mm.	[6]
Q.4	(a)	State the principle of interferometry.	[2]
	(b)	Discuss the applications of toolmaker's microscope.	[4]
	(c)	Explain the working of autocollimator with neat sketch.	[6]
Q.5	(a)	What is the significance of rolling test in gear metrology?	[2]
	(b)	Explain the working of floating carriage micrometer.	[4]
	(c)	Derive the expression for 'best size wire' in measuring effective diameter of screw thread through wire methods.	[6]
Q.6	(a)	Enlist various methods for straightness measurement.	[2]
	(b)	In the measurement of surface roughness, heights of 20 successive peaks and troughs were measured from a datum and were 35, 25, 40, 22, 35, 18, 42, 25, 35, 22, 36, 18, 42, 22, 32, 21, 37, 18, 35, 20 microns. If these measurements were obtained over a length of 20 mm, determine the C.L.A. and R.M.S. values of rough surface.	[4]
	(c)	Explain the working of Talysurf instrument for surface roughness measurement.	[6]
Q.7	(a)	Define and classify acceptance testing of a machine tool.	[2]
	(b)	Enlist the geometrical testings performed on a lathe machine.	[4]
	(c)	With neat sketch, explain the procedure for checking 'parallelism of spindle axis' and 'parallelism of tailstock guideways with the movement of carriage' in a lathe machine.	[6]

*******28/04/17******M**