



RF-3901

M. Sc. (Tech.) (Part-I) Examination

April / May – 2010

Instrumentation : Paper - 1

(Instruments Mechanism & Metrology)

Time : 2 Hours]

[Total Marks : 53

Instructions :

(1)

नीचे दृशावेक निशानीवाणी विगतो उत्तरवही पर अवश्य कपवी. Fillup strictly the details of signs on your answer book.	Seat No. :
Name of the Examination :	<input type="text"/>
<input type="text" value="M. SC. (TECH.) (PART-1)"/>	<input type="text"/>
Name of the Subject :	<input type="text"/>
<input type="text" value="INSTRUMENTATION - 1"/>	<input type="text"/>
Subject Code No. : <input type="text" value="3"/> <input type="text" value="9"/> <input type="text" value="0"/> <input type="text" value="1"/>	<input type="text"/>
Section No. (1, 2,.....) : <input type="text" value="NIL"/>	
Student's Signature	

- (2) All questions are compulsory.
(3) Figures to the right indicate full marks.
(4) Assume the data, if required.

- 1 (a) Describe different types of metal machining operations by giving proper examples. (3)
(b) Name various types of chips obtained during metal machining. When do you get the formation of continuous chips with built up edge. (3)
(c) What is meant by tool signature? (2)
(d) Explain unilateral and bilateral tolerances. (2)
(e) Define: Zero error, Basic size, Systematic Error. (3)
- 2 (a) Give complete classification of Shaper. (3)
(b) Explain the construction and working of Half Nut Mechanism of Lathe. (3)
(c) A Lathe has a lead screw having pitch as 4 TPI. The set of change gear has gears with 16, 18, 20, 22, 24, 26, 28, 32, 40, 44, 48, 52, 56, 64, 72, 76, 80, 84, 86, 100 and 127 teeth. Calculate change gear ratio to machine following threads on a job (a) 2.5 mm pitch (b) 12 TPI. (2)
(d) Calculate cutting speed and machining time for taking one complete cut on a plate of 700 mm X 300 mm on a shaper. The data associated with machining process are as under; (2)
• Feed rate 1.25 mm/stroke
• Ratio of return time to cutting time 3 : 5
• Approach and over travel 25 mm each
• Rotational speed of bull gear 40 rpm

OR

- 2 (a) Classify Lathe. (3)
(b) Explain the construction and working of tool head of Shaper. (3)

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[Contd....

- (c) A 1600 mm long shaft has a taper length of 12000 mm. The larger diameter is 130 mm and smaller diameter is 24 mm.
Calculate : (a) Conicity (b) Taper in mm per metre (c) Tailstock Set over and (d) Angle of Taper in degrees. (2)
- (d) Calculate cutting speed and machining time for taking one complete cut on a plate of 600 mm X 400 mm on a shaper. The data associated with machining process are as under; (2)
- Feed rate 1.6 mm/stroke
 - Ratio of return time to cutting time 2 : 5
 - Approach and over travel 20 mm each
 - Rotational speed of bull gear 35 rpm
- 3 (a) Differentiate between straddle milling and gang milling operation. (2)
- (b) What are the differences between grinding and other machining processes? (2)
- (c) Differentiate between drilling, boring and reaming operations. (2)
- (d) What is meant by grade and structure of a grinding wheel. (2)
- (e) Calculate the index crank movement for 123 divisions (2)
- OR**
- 3 (a) What are the uses of gears? Which are the different types of gears used for various applications? (3)
- (b) The helical plain milling cutter has fewer numbers of teeth. Why? (3)
- (c) Calculate index crank movement for 48 divisions. (2)
- (d) Calculate gear proportion and machining particulars to mill a gear with 28 teeth and 2.5 mm. module at a cutting speed of 35 m/min and feed rate of 0.05mm/tooth. The cutter used has diameter of 65 mm and has 10 cutting edges. (2)
- 4 (a) Write a short note on angle gauges. (6)
- (b) Explain Waviness, roughness, lay. (4)
- OR**
- 4 (a) Write a short note on Slip Gauges. (6)
- (b) Write a brief note on Passometer. (4)
- 5 (a) The divisions on the main scale of a vernier caliper are 0.5 mm apart. The vernier has 100 divisions equal in length to 98 main scale divisions. Calculate the least count (6)
- (b) For $25 H_7 d_7$ combination the given size falls in the diameter step of 18-30 mm, the fundamental deviation for hole is zero, the tolerance unit is $i = 0.045 (D)^{1/3} + 0.001 D$, $IT_7 = 16 i$. Find limits of size for hole and shaft and design suitable gauges. (4)
- OR**
- 5 (a) Explain with the neat sketch working of Mechanical Comparator. (6)
- (b) The limits for a hole - shaft combination are as follows;
- Hole --- $90.000^{+0.035}_{+0.010}$ mm, Shaft --- $90.000^{+0.025}_{+0.030}$ mm
- State the type of fit and maximum allowances. (2)
- (c) In a vernier caliper, the main scale is graduated in mm and the vernier scale 49 mm long is divided into 50 equal divisions. While using this vernier caliper for measuring the length of a bar, zero of vernier scale lies between 15 and 16 mm of the main scale and 13th division of vernier scale coincides with a main scale division. Find length of bar. (2)