INSTITUTE OF AERONAUTICAL ENGINEERING
(Autonomous)

Four Year B.Tech V Semester End Examinations(Regular) - November, 2019

Regulation: IARE – R16

MACHINE TOOLS AND METROLOGY

Time: 3 Hours   **(ME)**   **Max Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

UNIT – I

1. (a) Explain cutting speed, feed and depth of cut in context of single point lathe cutting tool. Support your answer with labeled diagrams. **[7M]**

    (b) Draw the Merchant's force diagram and obtain the expression for cutting velocity. **[7M]**

2. (a) Discuss the parameters that influence the life of cutting tool. **[7M]**

    (b) If the relationship for H.S.S tools is $VT_1/8 = C_1$ and for Tungsten carbide tools is $VT_1/5 = C_2$ and assuming that at a speed of 25m/min, the tool life was 3 hours in each case, compare their cutting lives at 32m/min **[7M]**

UNIT – II

3. (a) Describe the construction of an engine lathe with a labeled diagram. **[7M]**

    (b) Give the construction and working of drive mechanism used in a shaping machine. **[7M]**

4. (a) Discuss the main parts of a slotting machine and describe them briefly. Explain why the slotting machine is called as vertical shaper. **[7M]**

    (b) Discuss the different taper turning methods used on a central lathe machine. Differentiate shaper and planer machines. **[7M]**

UNIT – III

5. (a) Describe universal milling machine and its advantages. Explain the various milling cutters with neat sketches? **[7M]**

    (b) Could a side milling be used efficiently for cutting on one side only? Give reasons. **[7M]**

6. (a) Explain the different allied operations performed on drilling machine. **[7M]**

    (b) Find the time required to drill 5 holes in a CI flange of 40mm depth, if the hole diameter is 30mm. Assume cutting speed as 24.9 m/min and feed as 0.6 mm/rev. **[7M]**

UNIT – IV

7. (a) What is a sine bar? Give any two applications of a sine bar. **[7M]**

    (b) Calculate the cone angle of the taper plug gauge from the following data: Height of slip gauges, h_1=50.667, h_2=38.667. Length of sine bar=125mm. **[7M]**

8. (a) What is the difference between hole basis & shaft basis system. **[7M]**

    (b) How the following are designated
        i) Standard tolerance grade
        ii) Position of tolerance zone
        iii) Upper deviation
        iv) Lower deviation **[7M]**

UNIT – V

9. (a) Explain the working principle of laser interferometer with a neat sketch. **[7M]**

    (b) It is not possible to produce perfectly smooth surface. Justify the statement. **[7M]**

10. (a) List out the various methods of measuring the gear tooth thickness. Explain any two in detail. **[7M]**

    (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 on 20mm length, determine CLA and RMS values of rough surface. **[7M]**