# INSTITUTE OF AERONAUTICAL ENGINEERING
### (Autonomous)
B.Tech V Semester End Examinations (Supplementary) - January, 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) What are the major properties required for cutting tool materials? **[7M]**

   (b) Draw Merchants circle diagram and derive an expression to show relationships among the different forces acting on the cutting tool and explain different parameters involved in metal cutting.
   **[7M]**

2. (a) Explain various theories of metal cutting. **[7M]**

   (b) Write various functions of cutting fluids used in metal cutting. **[7M]**

## UNIT – II

3. (a) Describe with the help of neat sketch, the working principle of collet chuck. **[7M]**

   (b) What are the common operations performed on a planner? Describe briefly any two. **[7M]**

4. (a) Draw a neat sketch describing taper turning attachment method and explain its working principle.
   **[7M]**

   (b) Draw the block diagram of a slotting machine and explain briefly about various parts present on it. **[7M]**

## UNIT – III

5. (a) Describe the construction of Column and Knee type milling machine with a neat sketch.
   **[7M]**

   (b) Define up milling and down milling machining methods. Discuss any four milling operations with neat sketches. **[7M]**

6. (a) What is the application of twist drill. Describe twist drill nomenclature using appropriate sketch.
   **[7M]**

   (b) Explain the construction and working principle of a boring machine with a neat sketch. **[7M]**

## UNIT – IV

7. (a) Describe interchangeable assembly with suitable example. State its advantages. **[7M]**

   (b) The hole and shaft assembly of 30mm nominal size have tolerance specified as $30^{+0.02}_{-0.00}$mm for hole and $30^{-0.04}_{0.07}$mm for shaft. Determine. **[7M]**

   (i) Maximum and minimum (Clearance or Interference) attainable

   (ii) Allowance

   (iii) Hole and shaft tolerances

   (iv) Fundamental deviation.

   (v) Maximum material limit for shaft and hole

   (vi) Type of fit.

   Sketch these values on a conventional diagram.

8. (a) Explain the use of Sine bar for measuring angles and tapers with suitable diagrams. **[7M]**

   (b) List out the precautions to be taken care for slip gauges usage. **[7M]**

## UNIT – V

9. (a) Describe with a neat sketch principle and working of Tool maker's microscope? State the applications of this instrument. **[7M]**

   (b) With the help of a neat sketch describe the method of measuring the pitch of screw thread by using pitch measuring machine. **[7M]**

10. (a) Explain the comparison method used for measuring Surface finish. **[7M]**

    (b) Explain briefly the various forms of thread gauges with neat sketch. **[7M]**

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**INSTITUTE OF AERONAUTICAL ENGINEERING**

**(Autonomous)**

B.Tech V Semester End Examinations (Regular) - November, 2018

**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) What is a chip? Describe briefly about forming of chips and Discuss the various types of chips with neat sketches. **[7M]**

   (b) Explain briefly about the single point cutting tool nomenclature with a neat sketch. **[7M]**

2. (a) What are the various types of chips developed in metal cutting operation and explain about the stability of build up edges (BUE)? **[7M]**

   (b) In an orthogonal turning operation, cutting speed is 80 m/min, cutting force is 20Kg, feed force 8Kg,back rake angle is 15°, feed 0.2mm/rev and chip thickness 0.4mm. Determine the following:
   i) Shear angle
   ii) Work done in shear
   iii) Shear strain **[7M]**

## UNIT – II

3. (a) Discuss briefly about the various types of operations performed on a lathe machine with the help of neat sketches. **[7M]**

   (b) With neat sketches brief out the various work holding devices and tool holding devices used in lathe. **[7M]**

4. (a) Explain in detail about various thread cutting operation on a lathe machine with help of a neat sketch. **[7M]**

   (b) Explain with the help of a neat sketch about the planer machine and discuss its applications.
   **[7M]**

## UNIT – III

5. (a) Explain in detail about the column type milling machine and knee type milling machine with a neat sketch. **[7M]**

   (b) How does a gang drilling machine differ from multiple spindle drilling machines? Explain it with point wise basis. **[7M]**

6. (a) What are common operations which can be performed in a drilling machine? Describe any two of drilling machines in brief. **[7M]**

   (b) Sketch and describe the use of following milling cutters (i) Slab mill (ii) End mill (iii) Face milling cutter **[7M]**

## UNIT – IV

7. (a) Draw the schematic diagram of shaft basis system and hole basis system and define the basic terms. **[7M]**

   (b) Briefly explain about geometric characteristics and draw their symbols with a neat diagram. **[7M]**

8. (a) Explain the working principle of dial indicator with neat sketch and mention their suitable applications. **[7M]**

   (b) Discuss briefly about the interchangeability and selective assembly. **[7M]**

## UNIT – V

9. (a) What is interferometer? Explain the working principle of interferometer with neat sketch. Write its applications. **[7M]**

   (b) Discuss the measurement of optical projector and what are the advantages of optical projector. **[7M]**

10. (a) Explain the working principle of Talysurf with schematic layout. Explain their construction diagram with a neat sketch. **[7M]**

    (b) Discuss the various errors in screw thread measurement. Explain it with a neat sketch. **[7M]**

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