

B.E. MECHANICAL ENGINEERING THIRD YEAR FIRST SEMESTER - 2025**MACHINING TECHNOLOGY AND METROLOGY**

Time: 3 Hours

Full Marks: 100

Assume any relevant data, if necessary. Symbols in the Question Paper carry their usual meanings. Figures in the margin indicate full marks. All Parts of any one question must be answered together

Answer any five questions**20×5=20**

- Q1.** a) State the properties a cutting tool material essentially possess and why? Discuss about HSS and Carbide as cutting tool material.
b) Draw a single-point turning tool and visualize its different rake angles, clearance angles and cutting-edge angle in machine reference or ASA system. (6+6) +8=20
- Q2.** a) State the differences among abrasion wear, adhesion wear and diffusion wear in respect of cutting tool wear.
b) Under a given condition of turning, the tool life was found to decrease from 24 min to 16 min when only the cutting velocity V_c was raised from 200 m/min to 250 m/min. What will be the tool life if the cutting velocity is further increased to 300 m/min under the same machining condition? (4+6) +10=20
- Q3.** a) State the functions of feed rod and lead screw of a Lathe. Explain apron mechanism of Lathe with a schematic diagram.
b) Explain different taper turning methods with neat sketches (4+8) +8
- Q4.** a) Write a short note on creep feed grinding.
b) Explain the following grinding wheel specification:
W A 46 K 5 V 17
c) Find the time required for taking a complete cut on a plate 600 mm×900 mm, if the cutting speed is 9m/min. The return time to cutting time ratio is 1:4 and feed is 3 mm. the clearance at the end is 75 mm. 5 +7+8=20
- Q5.** a) Explain the working principle of Electro Discharge Machining (EDM) with a neat sketch. Explain the function of dielectric fluid used in EDM.
b) An alloy contains Ni (72.5%), Cr (19.5%), Fe (5.0%), Ti (0.4%), Si (1.0%), Mn (1.0%) and Cu (0.6%). The related information about the metals is given below:
- | Metal | Gram atomic weight | Valency of dissolution | Density (g/cc) |
|-------|--------------------|------------------------|----------------|
| Ni | 58.71 | 2 | 8.90 |
| Cr | 51.99 | 2 | 7.19 |
| Fe | 55.85 | 2 | 7.86 |
| Ti | 47.90 | 3 | 4.51 |
| Si | 28.09 | 4 | 2.33 |
| Mn | 54.94 | 2 | 7.43 |
| Cu | 63.57 | 1 | 8.96 |
- Calculate the MRR in cm^3/min when a current of 1000 A is passed. 6+4+10=20
- Q6.** a) With the help of an illustration, explain the following terms: roughness, waviness, lay, and flaws. What are the primary reasons for surface irregularities?

[Turn over

Ref. No.: Ex/ME/5/T/314/2025

b) Explain RMS, R_a and R_z values of surface roughness. Explain in brief the principle and operation of Taylor–Hobson Talysurf roughness instrument. $8+2+6+4=20$

Q7. a) Explain two wire and three wire method for measuring pitch diameter of thread.

b) What are the design considerations for a Comparator.

c) Discuss the working principle of Eden-Rolt Millionth comparator. $(3+2) + 5+10=20$