Ref. No.: Ex/ME(M2)/PC/B/T/315/2024(S)

B.E. MECHANICAL ENGINEERING THIRD YEAR FIRST SEMESTER SUPPLEMENTARY EXAM – 2024

MACHINING TECHNOLOGY AND METROLOGY

Time: 3 Hrs. **Full Marks: 100**

Answer any five questions from the following

1. a) Discuss the working principle of ECM.
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. **10+10**

2. a) Discuss diamond and carbide as tool material.
b) A single point turning tool is designated as: (-7^0)-(-7^0)-10^0-10^0-75^0-75^0- 1.2 in (ORS). Sketch the views of the tool to show all the relevant features of it. **10+10**

3. a) write the specification of lathe and shaper
b) Cast iron and mild steel job are to be machined in a lathe by using HSS and cemented carbide tools. The diameter of job varies from 30 mm to 75 mm. Assuming suitable cutting speeds, determine the speeds of a nine speed gear box considering both AP and GP variation of speeds. **8+12**

4. a) Explain shortly with diagram: drilling, boring and reaming.
b) Write difference between up milling and down milling.
c) Compare between reciprocating types machine tools: shaper, slotter and planner. **6+6+8**

5. a) Write the specification of a grinding wheel.
c) Discuss different taper turning methods can be performed in lathe with neat sketch. **8+4+8**

6. a) State the different components of a surface texture.
b) Show different types of flat surface and smooth surface.
c) What are reasons for controlling surface roughness?
d) Discuss the different types of surface roughness assessment. **3+4+5+8**

7. a) Explain with neat sketch different types of error in form of cylindrical surfaces and co-ordination of surfaces.
b) What is machining accuracy? Explain maximum attainable accuracy and economically feasible accuracy with neat sketch **12+8**