

Name:	
Enrolment No:	

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2019

Course: B.Tech. Mechatronics	Semester: V
Course: Manufacturing Technology	Time: 03 hrs.
Course code: MEPD 3002	Max. Marks: 100
No. of pages: 2	Instructions:

SECTION A

S. No.		Marks	CO
Q1.	Discuss various types of fits along with their clearance and interference conditions.	5	CO2
Q2.	Discuss the classification of manufacturing processes.	5	CO1
Q3.	Differentiate between Flank wear and Crater wear of cutting tool.	5	CO2
Q4.	Discuss the classification of various machines based on the movement of motion of tool and workpiece.	5	CO2

SECTION B

Q5.	<p>Low carbon steel having a tensile strength of 300 MPa and a shear strength of 220 MPa is cut in a turning operation with a cutting speed of 3.0 m/s. The feed is 0.20 mm/rev and the depth of cut is 3.0 mm. The rake angle of the tool is 5° in the direction of chip flow. The resulting chip ratio is 0.45. Using the orthogonal model as an approximation of turning, determine</p> <p>(a) The shear plane angle, (b) Shear force, (c) Cutting force and feed force.</p>	10	CO3
Q6.	<p>(a) The following operations are to be performed on a round bar of diameter 60 mm and 100 mm length.</p> <p>1) Milling: The hexagonal prism is to be made up to half of length of round bar. The feed is 30mm/min and set up time is 2 min per face, added table travel as 10 mm.</p> <p>2) Drilling: A 10 mm through hole is done along the length on drilling machine with cutting speed 30 m/min and feed rate 0.25 mm/rev. The lip angle of drill used is 135°. Assume approach and over travel as 3 mm each.</p> <p>Calculate the total time needed to obtain the final piece. Also calculate the MRR for drilling operation.</p>	10	CO3
Q7.	<p>A batch of 10 cutting tools could produce 500 components while working at 50 rpm with a tool feed of 0.25 mm/rev and depth of cut of 1 mm. A similar batch of 10 tools of the same specification could produce 122 components while working at 80 rpm with a feed of 0.25 mm/rev and 1 mm depth of cut. How many components can be produced with one cutting tool at 60 rpm? Use Taylor's tool life equation $VT^n = C$</p>	10	CO3

Q8.	<p>Design GO and NO GO gauge for checking the assembly 25H7/ f8. Comment on the type of fit. Given: The fundamental deviation for shaft designation 'f' is -5.5 D^{0.41} The values of standard tolerances for grades of IT 7 and IT 8 are 16i and 25i respectively. 25 mm diameter lies in the diameter step range of 18-30 mm.</p> <p style="text-align: center;">Or</p> <p>Find the limit sizes, tolerances and allowances for a 100 mm diameter shaft and hole pair designated by F8h10. Also specify the type of fit that the above pair belongs to. Given: 100 mm diameter lies in the diameter step range of 80-120 mm. The fundamental deviation for shaft designation 'f' is -5.5 D^{0.41} The values of standard tolerances for grades of IT 8 and IT 10 are 25i and 64i respectively. Also, indicate the limits and tolerance on a diagram.</p>	10	CO3
SECTION-C			
Q9.	<p>a) During a steady state gas metal arc welding with direct current electrode positive, the welding current, voltage, and welding speed are 150A, 30V, 6m/min. A metallic wire electrode of diameter 1.2 mm is being fed at a constant rate of 12m/min. The density, specific heat and melting temp of the wire electrode are 7000 kg/m³, 500J/Kg, 1530°C. Assuming ambient temp to be 30°C and neglect latent heat of melting. Further consider that 2/3rd of the total electrical power is available for melting. Calculate the melting efficiency of the wire electrode?</p> <p>b) Compare the solidification time of 2 optimum side risers. One is cylinder and other is a square parallelepiped. Both have same material and same volume.</p>	10	CO4
Q10.	<p>a) Explain the following welding procedures</p> <ol style="list-style-type: none"> 1. Plasma arc welding 2. Oxyacetylene welding <p>b) Explain in detail the cold chamber pressure die casting process with neat diagram along with its applications.</p> <p style="text-align: center;">Or</p> <p>a) Explain in detail resistance welding and its types with their advantages-disadvantages and applications.</p> <p>b) Explain in detail the investment casting process with neat diagram along with its applications.</p>	10 10 10 10	CO1