UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, April/May 2018

Course: Metrology & Manufacturing Technology **Semester: IV**
Program: B. TECH ADE
Time: 03 hrs. **Max. Marks: 100**

SECTION A

S. No.		Marks	CO
Q 1	Differentiate between punching & blanking on the basis of i) Workpiece & scrap ii) Punch size & Die size	4	CO4
Q 2	Name the type of fit occurring between i) Joint of cycle axle & its bearing ii) Joint between a pulley & a shaft transmitting power iii) Assembling bush bearing in housing iv) joint of lathe spindle & its bearing	4	CO1
Q 3	State & explain the pattern used for producing parts having internal projections.	4	CO5
Q 4	Differentiate between counter boring & counter sinking operations.	4	CO3
Q 5	Name the different types of error occurring during measurement.	4	CO1
	SECTION B		
Q 6	Give the classification scheme of extrusion processes. With the help of neat sketches, differentiate between direct extrusion & indirect extrusion. **OR** Sketch & explain the different rolling mills.	4+6 **OR** 10	CO4
Q 7	Explain the different types of shrinkages occurring during solidification of casting along with their method of compensation.	10	CO5
Q 8	Differentiate between i) turret lathe & capstan lathe ii) up milling & down milling	5+5	CO3
Q 9	State the Taylor's principle of Gauge design. Design a plug gauge for inspecting a hole of dimensions $100^{\pm 0.1}$ mm.	4+6	CO1

	SECTION C		
Q 10	Derive the expression for pressure during forging of a rectangular bar while	20	CO4

	considering both sticking & sliding friction.		
Q 11	a) In orthogonal turning of an engineering alloy, it has been observed that the friction force acting at the chip tool interface is 402.5 N & the friction force is also perpendicular to the cutting velocity vector. The feed velocity is negligibly small in comparison to the cutting velocity. The ratio of friction force to normal force associated with the chip tool interface is 1. The uncut chip thickness is 0.2 mm & the chip thickness is 0.4 mm. The cutting velocity is 2 m/sec. Calculate i) Shear force acting along the shear plane. ii) The rate of heat generation at the primary shear plane. b) Explain the importance of Merchant's circle in metal cutting. For $\alpha=0^o$ & $\mu=1$, draw Merchant's circle diagram, where the symbols have usual meanings. OR	**5+5** **3+7**	**CO2**
Q 11	a) In an orthogonal cutting experiment, a HSS tool having the following tool signature 0-10-7-7-10-75-1 has been used. Given width of cut = 3.6 mm; shear strength of the workpiece material = 460 N/mm^2, depth of cut = 0.25 mm, coefficient of friction at the tool chip interface is 0.7. Calculate the shear plane angle for minimum cutting force. b) With the help of a neat sketch, explain the different velocities in metal cutting along with their expressions.	**10** **10**	