

Name:  
Enrolment No:



UNIVERSITY OF PETROLEUM AND ENERGY STUDIES  
End Semester Examination, May 2020

Course: Metal forming principle and design  
Program: B.Tech ADE  
Course Code: ADEG 435

Semester: VIII  
Time 03 hrs.  
Max. Marks: 100

Instructions:

SECTION A

S. No.		Marks	CO
Q 1	Value of plain strain yield strength in terms of unidirectional flow strength $\sigma$ is given by. a) $\sigma/\sqrt{3}$ b) $\sigma/2$ c) $2\sigma/\sqrt{3}$ d) $2\sigma$	5	CO1
Q 2	A material is subjected to stresses in the ratio $\sigma_1, \sigma_2= 0.3\sigma_1$ , and $\sigma_3 = -0.5\sigma_1$ . Ratio of $\sigma_1/Y$ at yielding using the von Mises criterion ( $Y$ =yield strength) is.....	5	CO1
Q 3	A blank of 50 mm diameter is to be sheared from a sheet of 2.5 mm thickness. Shear strength of the sheet 351.56 MPa. The punch and die diameter (in mm) for this operation respectively are. a) 50.00 and 50.30 b) 50 and 50.15 c) 49.70 and 50.00 d) 49.85 and 50.00	5	CO2
Q 4	A brass billet has to extrude from initial diameter of 100mm to a final diameter 50mm. the average flow stress during extrusion is 250 MPa. Value of extrusion force required for extrusion is.....MN.	5	CO2
Q 5	“Material is forced through the porthole die. And final product is having a good strength.” The given statement is related to. a) Wire drawing b) Rod Extrusion c) Forging d) Tube extrusion.	5	CO3
Q 6	“Electricity is passed in the coil which will generate the eddy current in the workpiece material. Workpiece will produce its own field. Two opposing field will cause the coil to collapse on the die”. The given statement is related to a) Close die forging b) Drawing c) Nibbling d) High-energy rate forming.	5	CO3

SECTION B

Q 7	Describe the effect of strain rate and temperature in metal forming operation.	10	CO1
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Q 8	<p>A steel is rolled by 30 % from the initial thickness of 50mm using 900 mm diameter rolls. The slab width is 800mm. material is having yield strength of 350 MPa. Assume coefficient of friction acting at the contact surface is 0.3. Use Tresca's criteria under plain strain condition. Rolls are rotating with the 300 rpm. finds</p> <p>a) Rolling load per roll (neglecting sticking friction) (4)  b) Maximum draft (2)  c) Total torque and power required (4)</p> <p style="text-align: center;"><b>OR</b></p> <p>For punching a 15mm circular hole and cutting a rectangular blank of 50x 200 mm from a sheet of 1mm thickness (mild steel shear strength 240 MPa). Calculate in each case :</p> <p>i. size of the punch  ii. Size of the die  iii. Force required</p>	<b>10</b>	<b>CO2</b>
Q 9	<p>a) Explain advantage and disadvantages of hot working over cold working operation.  b) Describe the effect of friction in extrusion process. Enlist the steps used for lubrication in Extrusion process.</p>	<b>10</b>	<b>CO1</b>
Q 10	<p>A wire drawing operation is performed using conical die having a die angle of 14°. Input rod is having the diameter of 12mm and reduction of 25% is observed after drawing process. Unidirectional yield flow strength of the material is 650 MPa. Coefficient of friction is 0.1 and output wire speed is 5 m/s. find the value of drawing stress and power required in the process.</p>	<b>10</b>	<b>CO2</b>
Q 11	<p>Explain about the following defects related to metal forming , also mention causes and remedies of given defects</p> <p>i. Wavy edge  ii. Alligatoring  iii. Chevron crack  iv. Oxides ring formation.</p>	<b>10</b>	<b>CO3</b>
<b>SECTION-C</b>			
Q 12	<p>a) Compare forward, backward and hydrostatic extrusion process  b) Classify high-energy rate forming processes. Describe the explosive forming process.</p> <p style="text-align: center;"><b>OR</b></p> <p>a) Compare open die and close die-forging operation.  b) Describe various methods of Extrusion of pipe and tubing.</p>	<b>20</b>	<b>CO3</b>