Name: **Enrolment No:**	UPES

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

Online End Semester Examination, May 2021

Programme Name: B.Tech ADE **Semester : VIII**
Course Name : Metal forming principles and design **Time : 03 hrs**
Course Code : MEPD 4002P **Max. Marks : 100**
Nos. of page(s) : 2

SECTION A

S. No.		Marks	CO
Q 1	A material is subjected to stresses in the ratio σ1, σ2= 0.3σ1, and σ3 = −0.5σ1. Find the ratio of σ_1/Y at yielding using the von Mises criterion.(Y=yield strength)	**5**	**CO1**
Q 2	'Sticking friction become significant at high load and high temperature forming'. Justify the given statement	**5**	**CO3**
Q 3	Classify high-energy rate forming operations. Enlist the advantages of explosive forming	**5**	**CO3**
Q 4	Mark true or false for below mentioned statements. i) True stress will always be higher than engineering stress. ii) Value of engineering strain will be same in tension and compression both if it is deformed to the same levels. iii) At higher temperature the strain rate sensitivity will be more iv) Hot working of high thickness material produces variable grain structure v) Tresca and Von Mises criteria gives different values under uniaxial stress condition.	**5**	**CO1**
Q-5	Compare Punching and blanking process	**5**	**CO3**
Q-6	Find the value of maximum draft if 800 mm diameter rolls having coefficient of friction of 0.2 do rolling. Also, enter the value of bite angle under this condition.	**5**	**CO2**

SECTION B

Q 7	A steel is rolled by 30 % from the initial thickness of 30 mm using 800 mm diameter rolls. The slab width is 700 mm. material is having yield strength of 300 MPa. Using Von Mises criteria under plain strain condition. Rolls are rotating with the 300 rpm. Take the value of coefficient of friction as 0.3. Determine a) Rolling load per roll (neglecting sticking friction) b) Total torque and power required **OR** Differentiate between compound and progressive die with the help of neat sketch. A circular washer of inner diameter 20 mm and outer diameter 60mm has to made by mild steel plate of thickness 1mm (shear strength 240 MPa) find out the machine capacity in tons for	**10**	**CO2**

	i. compound die ii. Progressive die		
Q 8	Derive the expression of force and power calculation in extrusion process (neglecting friction)	**10**	**CO2**
Q 9	A cup of 10 cm height and 5 cm diameter is to be made from a sheet of two mm thickness. Find out the number draws required.	**10**	**CO2**
Q-10	Describe the effect of strain rate and temperature in metal forming operation.	**10**	**CO1**
Q-11	Derive the relationship between True stress and true strain with engineering stress and engineering strain.	**10**	**CO1**
SECTION-C			
Q 12	a) Explain advantages, disadvantages and applications of various types of rolling mills. b) Describe explosive forming processes. Enlist their advantage, disadvantage and applications OR a) Compare forward, backward and hydrostatic extrusion process. b) Describe electrohydraulic forming processes in detail. Enlist its advantages, disadvantages and applications.	**20**	**CO3**