Name: **Enrolment No:**	UPES UNIVERSITY WITH A PURPOSE

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
Online End Semester Examination, December 2020

Course: Principles of Engineering Design **Semester: V**
Program: B. Tech. FSE **Time 03 hrs.**
Course Code: HSFS 3002 **Max. Marks: 100**

SECTION A

Each question carries 5 Marks

S. No.	**Question**	**CO**
Q 1	Write all factors need to be considered during engineering design.	**CO1**
Q2	Write short note on: a. Solid length b. Free length c. Spring index d. Spring rate	**CO1**
Q3	Write Clavarino's equation and mention the use of this equation.	**CO2**
Q4	Define 'pitch', back pitch, diagonal pitch and 'margin' of riveted joint	**CO2**
Q5	List various types of welded joints.	**CO1**
Q6	Why Poisson's Ratio is important for finding out the dimensional changes? Why the efficiencies of joints effect the design of pressure vessel?	**CO2**

SECTION B

Each question carries 10 marks

Q 7	Write the expression of Lame's equation for radial stress and tangential stress.	**CO3**
Q 8	Maximum shear stress induced in the wire of a helical spring, $$\tau = K\frac{8 * W * C}{\pi * d^2}$$ Derive the equation with suitable assumptions and diagrams.	**CO4**
Q 9	A helical spring is made from a wire of 6mm diameter and has outside diameter of 75mm. If the permissible shear stress is 340 MPa and modulus of rigidity 80 kN/mm2, Find the axial load which the spring can carry and the deflection per active turn.	**CO4**
Q 10	A plate 100 mm wide and 10 mm thick is to be welded to another plate by means of double parallel fillets. The plates are subjected to a static load of 80 KN. Find the length of weld, if the shear stress is 55 MPa.	**CO4**

Q 11	Describe the stresses acting in the cylindrical pressure vessel. Derive the minimum thickness of metal sheet required in a cylindrical pressure vessel to overcome the stresses. Use the suitable diagrams and assumptions.	**CO3**
	Section C **Each question carries 20 Marks.**	
Q12	A double riveted lap joint is made between 15 mm thick plates. The rivet diameter and pitch are 25 mm and 75 mm respectively. If the ultimate stresses are 400 MPa in tension, 320 MPa in shear and 640 MPa in crushing, find the maximum force per pitch which will rupture the joint. If the above joint is subjected to a load such that the factor of safety is 4, find out the actual stresses developed in the plates and the rivets	**CO5**