Name:

Enrolment No:

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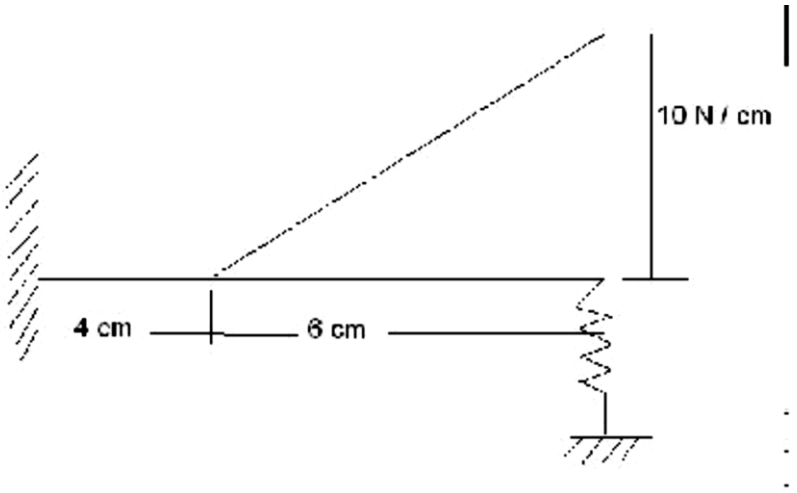
UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester/Supplementary Examination, July 2020

Course: Finite Element Method — **Semester: II**
Program: M.Tech. Structural Engineering — **Time 03 hrs.**
Course Code: CIVL 7014 — **Max. Marks: 100**
Instructions:

SECTION A

S. No.		Marks	CO
Q 1	State the three phases of finite element method.	**4**	**CO1**
Q 2	Name the variation methods.	**4**	**CO1**
Q 3	Name the weighted residual method	**4**	**CO1**
Q 4	Differentiate between global and local axes.	**4**	**CO1**
Q 5	Distinguish between potential energy function and potential energy functional	**4**	**CO1**

SECTION B

Q 6	A beam with clamped support at one end and spring support at the other end. A linearly varying transverse load of max.magnitude 100 N/cm is applied in the span 4 cm <x<10 cm. solve the problem by FEM method EI= 2 x 10^7 N cm^2 	**20**	**CO1**
Q 7	Obtain 3D stress and strain for a simply supported bar element using FEM.	**20**	**CO3**

SECTION-C

Q 8	A spring assemblage with arbitrarily numbered nodes. The nodes 1 & 2 are fixed & a force of 500 kN is applied at node 4 in the x direction. Calculate the following; Global stiffness matrix, Nodal displacements	**20**	**CO2**
Q 9	For a tapered plate of uniform thickness t=10mm, find the displacement at the nodes by forming into two element model. The bar has mass density ρ=7800 kg/m3, Young's modulus, E=2 x 10^5 MN/m^2.In addition to self-weight, the plate is subjected to the point load p=10kN at its centre.	**20**	**CO4**