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

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2019

Course: Industrial Structures **Semester: I**
Program: M.Tech. (Structural Engineering) **Time 03 hrs.**
Course Code: CIVL7004 **Max. Marks: 100**

Instructions: Attempt all Questions. Assume suitably any data not given and state clearly.

SECTION A

S. No.		Marks	CO
Q 1	**Plot the general wind velocity variation diagram, and using exponential equation calculate the wind velocity for a building to be constructed at Dehradun at heights of 20m, 30m, 40m and 50m. Use Basic wind velocity for Dehradun as 44m/s.**	**4**	**CO1**
Q 2	**A tall building of 25 storeys has 3m height of each storey and a plaza floor 5m high. If the drift index as per IS code is 0.002, calculate the drift in worst case.**	**4**	**CO2**
Q 3	**In designing an industrial steel chimney, explain when and why the weight of lining should be neglected when checking for stresses in the steel plate.**	**4**	**CO3**
Q 4	**A steel tower is made up of determinate panel. What can be its solidity ratio. Explain.**	**4**	**CO4**
Q 5	**How can dust affect the sag of cable attached to a transmission tower.**	**4**	**CO5**
	SECTION B		
Q 6	**The roof of an industrial shed has tubular purlins fitted on trusses. The trusses are placed at a spacing of 5m c/c. The roof carries a panel load of 15KN. Calculate the required section modulus for selection of the tubular purlin section. Assume the yield stress of the steel tube as 240 MPa.**	**10**	**CO1**
Q 7	**A 400 KV transmission line constructed to transmit power from main power station to city sub station consists of transmission towers spaced 100m apart. The 'Moose' cable is used to construct the transmission line. Calculate** **a. the sag in the cable.** **b. The minimum height of the transmission tower to be designed.** **Cable data given at the end of Question paper may be used.**	**10**	**CO3**

Q 8	**The management of a thermal power plant decides to construct a hyperbolic cooling tower for the plant and allocates a space of 140m for it. From air turbulence considerations, the height of tower has been fixed as 188m. Suggest the salient dimensions of cooling tower. Calculate the characteristic dimension of cooling tower.**	**10**	**CO4**
Q 9	**Explain how the height of a electric transmission tower can be determined.** **or** **Prove that the tension in the transmission tower is infinite if sag is zero.**	**10**	**CO5**
	SECTION-C		
Q 10	**An industrial shed is constructed in industrial area at Delhi. The shed has a plan area of 15x60m, with columns 5m high spaced at 4m c/c.** **The roof of shed is made up Fink trusses of 15m span and 3m high, supporting purlins at panel points. Calculate the wind load per panel acting on the roof and show in a diagram the wind loads to be considered for designing the roof truss.** **Assume following data:** **a. Design wind speed = 44m/s.** **b. Shed has normal permeability towards wind.** **c. External pressure coefficients:** **Wall – Wind normal to wall – windward side : 0.7** **- Leeward side : -0.25** **- Wind parallel to wall- windward side : -0.5** **- leeward side : -0.5** **Roof - Wind normal to roof – windward side : -0.33** **- Leeward side : -0.4** **- Wind parallel to roof- windward side : -0.7** **- leeward side : -0.7**	**20**	**CO2**
Q 11	**A industrial chimney is made up of steel plates 6mm thick and has a refractory brick lining 100mm thick. Calculate the design stresses in the chimney plate at a height of 10m from the top if the chimney is subjected to a wind load moment of 80KNm at that level .** **Assume chimney diameter as 2.5m and unit weight of steel and lining as 79KN/m^3 and 20KN/m^3 respectively.**	**20**	**CO3**

Or

An industrial chimney to be constructed at Delhi of diameter 3m has a height of 60m above the flared portion of the chimney. To design the chimney, it is divided into six panels of 10m height each. The height and terrain factor 'k_2'has been calculated for each panel as follows starting from top of chimney :

Panel starting from top	K_2
1	1.2
2	1.19
3	1.17
4	1.16
5	1.15
6	1.12

Assume the basic wind velocity as 47m/s, and flat ground calculate the wind load moment at the top of the flared portion of the chimney. Take C_f = 0.7

Details of ACSR Conductor for transmission lines "Moose" 400 KV and "Zebra"220 KV respectively.

	Weight (kg/km)	overall Dia(mm)	Area (mm2)	Area of Al (mm2)	UTS (Kg)	MPa
400 KV line	1998	31.77	597	528.5	16224	2368
220 KV line	1621	28.62	484.59	428.9	13000	2334

Minimum ground clearance from power conductor (mm)

400 KV 8840mm

220 KV 7050 mm