Name:

Enrolment No:

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2018

Course: Petroleum Production and Systems Design(PTEG 424) **Semester: VII**
Programme: B.Tech (APE-GAS)
Time: 03 hrs. **Max. Marks: 100**
Instructions: Assume appropriate data if missing. Draw graphs/diagrams wherever necessary.

SECTION A

S. No.		Marks	CO
Q 1	How the effect of wellhead backpressure on a total fluid production rate for the following given data? Production rate, BLPD: 0, 1000, 2000, 3000, 4000, 5000 Wellhead pressure(psi): 50, 100, 150, 200, 250, 300, 350, 400 Tubing size, (in): 2.38, 2.75, 4.13, 6.75	8	CO1
Q 2	Illustrate the general design procedure of heater-treater.	7	CO2
Q 3	Construct a typical production group gathering station flow sheet and label all the notations.	8	CO3
Q 4	a) Write the emulsion theory. b) List out the widely-used valves in oil and gas production facilities	3+4	CO4

SECTION B

Q 5	Distinguish various kinds of pumps and their advantages and disadvantages	5+5+5	CO4
Q 6	Relate and contrast vertical, horizontal and spherical separators with suitable applications.	5+5+5	CO5
Q 7	a) Calculate the work done in compressing 2 kg of gas (gravity = 0.65) polytropically from an initial temperature of 20°C and pressure of 700 kPa to a final pressure of 2000 kPa. Use a polytropic exponent of 1.5. The base pressure and base temperature are 101 kPa and 15°C, respectively. b) Calculate the compressor horsepower required for an adiabatic compression of 106 MMSCFD gas with inlet temperature of 68°F and 725 psia pressure. The discharge pressure is 1305 psia. Assume the compressibility factors at suction and discharge conditions to be Z_1 = 1.0 and Z_2 = 0.85, respectively, and the adiabatic exponent is 1.4, with the adiabatic efficiency η= 0.8. If the mechanical efficiency of the compressor driver is 0.95, what BHP is required? Calculate the outlet	5+10	CO3

	temperature of the gas.		
	SECTION-C		
Q 8	Design a horizontal two-phase separator for the below data Flow Rate: 10 MMscfd at 0.6 specific gravity 2,000 bopd at 40° API Operating Pressure: 1,000 psia Operating Temperature: 60° F C_D = 0.851, Z = 0.84, d_m = 140 microns, viscosity = 0.013 cp. **Table-1.0**	**25**	**CO5**

d, in	Gas, L_{eff}	Liquid, L_{eff}	L_{ss}	$12L_{ss}/d$
16	2.5	33.5	44.7	33.5
20	2.0	21.4	28.5	17.1
24	1.7	14.9	19.9	9.9
30	1.3	9.5	12.7	5.1
36	1.1	6.6	9.1*	3.0
42	0.9	4.9	7.4*	2.1
48	0.8	3.7	6.2*	1.6

	(OR) Solve for pressure drop in a 4-in. and 6-in. ID line using the following data by various equations. a. General equation b. Assumption of AP < 10% P! c. Panhandle B Equation d. Weymouth Equation. Flow rate: Gas = 23 MMscfd, Viscosity: = 3 cp Gas gravity = 0.85 Length = 7000 ft. Inlet pressure = 900 psi Temperature = 80°F Z =0.67, ε = 0.004, f = 0.0198 (for 4 .in from chart), f = 0.0108 (for 6 .in from chart), E = 0.95 (assumed)	**25**	