Name: Enrolment No:	UPES

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

Course: M. Tech Petroleum Engineering **Semester: III**
Programme: Coal Bed Methane, Gas Hydrate & Shale Tech. Course Code: PEAU 8001
Time: 03 hrs. **Max. Marks: 100**
Instructions:

SECTION A [20 marks]

S. No.		Marks	CO
Q 1	(a)Describe briefly how the kerogen types influence the shale gas/oil generation. (b)Explain the techniques of bitumen extraction from shale.	**2+3=5**	CO1
Q 2	State the significance of mineral composition study of shales for multiscale hydrofracturing.	**5**	CO2
Q 3	List the geological and geochemical controlling factors of CBM generation and production.	**5**	CO3
Q 4	Describe how to calculate shale gas and CBM reserves?	**5**	CO4
SECTION B [40 marks; Q8 has internal choice]			
Q 5	(a) Elaborate the significance of microfracture in shale gas and coal bed methane exploration. (b) Discuss the flow of gases in shale/coal in free, adsorbed and dissolved state.	**6+4=10**	CO2
Q6	(a)Enumerate the applications of nano technology in shale gas extraction (b) Discuss the role of nanoparticles to improve the inhibition capacity and mechanical property.	**5+5=10**	CO3
Q7	(a) Explain the techniques to improve the rheological properties of drilling fluid for unconventional oil/gas resources extraction. (b) Compare the hydrofracturing fluid chemistry in conventional and unconventional drilling process.	**5+5=10**	CO4
Q8	(a) What are the controlling factors of gas hydrate formation in permafrost region? (b) Explain the geophysical methods of gas hydrate exploration.	**5+5=10**	CO5
(or) Q8	(a) Discuss the ratio of number of large cages/small cages in different hydrate structures such as s-I, s-II and sH. (b) Describe the environmental impact of gas hydrate extraction.	**5+5=10**	CO6
SECTION-C [40 marks; Q10 has internal choice]			
Q 9	(a) A source rock with 4 wt % of TOC releases 0.05mgHC/g Rock free gases, 6.3mgHC/g Rock HC gases and 0.45 mg CO_2/g Rock CO_2 gases at 412ºC, 467ºC and 570ºC temperature respectively. Calculate the source rock potential and analyze it in terms of shale oil/gas generation efficiency. (b) Draw a flow chart and explain the extraction methods of shale gas and development of current practices.	**5+7+8=20**	CO1; CO2

	(c) Evaluate the environmental issues of shale gas exploitation.		
Q10	(a) Relate the Fracture Network Analyses to CBM Reserve Estimation. (b) Discuss the processes of multilayer adsorption analyses through BET isotherm. (c) The following data are given for the X Field: [Area = 20,000 acres Net productive thickness = 50 ft Porosity = 4% Average Sw = 55% Initial reservoir pressure, pi = 3180 psia Abandonment pressure, pa = 300 psia Bo at pi = 1.68 bbl/STB Bo at pa = 1.15 bbl/STB Sg at pa = 34% Sor after water invasion = 20%] Calculate the original oil/gas in place.	**5+5+10=20**	C03; CO6
Q10	**(OR)** (a) The volume of nitrogen at 1atm and 273K require to cover 1g of the silica get is 0.129 dm^3. Calculate the surface area of the get it each nitrogen molecule occupies an area of 16.2 X 10^{-20} m^2 (b) Discuss different imaging techniques of nano pores in shale and coal. (c) Evaluate the chemical enhanced recovery methods for CBM/shale gas extraction.	**5+7+8=20**	Co3; CO6