UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, May 2023

Course: Transportation and Marketing of Petroleum and Petroleum Products   **Semester: VIII**
Program: B.Tech:APE(UP)   **Time: 03 hrs.**
Course Code: PEAU 4011P   **Max. Marks: 100**

Instructions: Assume suitable and necessary data if required and Justify

SECTION A
(5Qx4M=20Marks)

Q 1	What is the future outlook of pipelines in india?	4	CO1
Q 2	How Single point mooring work?	4	CO1
Q 3	Define the term "Adiabatic efficiency" and hydraulic balance in compressors.	4	CO3
Q 4	List out energy conservation opportunities in pumping systems?	4	CO3
Q 5	Distinguish between COCOs and retail fuel stations.	4	CO4

SECTION B
(4Qx10M= 40 Marks)

Q 6	A liquid has a temperature versus viscosity relationship as below:	10	CO1

Temp °F	65	185
Viscosity (cSt)	755	30

a. Calculate the constants A and B that define the viscosity versus temperature correlation for this liquid using ASTM equations.
b. What is the estimated viscosity of this liquid at 85°F? Assuming C and D values remains same as in the first case.

Q 7	Discuss in detail how pressure surge damage can be avoided in pipelines.	10	CO2
Q 8	A gas pipeline is used for transporting gas between the two stations. Applying the fundamental knowledge for horse power calculations, calculate the compressor horsepower required for an adiabatic compression of 106 MMSCFD gas with inlet temperature of 68°F and 725 psia pressures. 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 = 1.4, with the adiabatic efficiency = 0.8. If the mechanical efficiency of the compressor driver is 0.95, what BHP is required? Also, calculate the outlet temperature of the gas.	10	CO3

Q 9	Examine key challenges in natural gas distribution.	10	CO4

SECTION-C
(2Qx20M=40 Marks)

Q 10	Crude oil is to be transported from an oil field to a refinery, located 750 kilometers away from the source through a steel pipeline 40 cm diameter. The difference in level between the two is negligible. Determine theoretically power required to overcome friction in line. Since maximum allowable pressure in any section of the line is 435 psi it will be necessary to insert additional pumping stations at suitable intervals along the line. Each station increases the pressure which drop to 247 psi at the inlet to the next pumping station. How many pumping stations are required? **Data:** Viscosity of Crude Oil is 0.47 P, Specific Gravity of Crude oil is 0.87, Flow rate is 300 m^3/hr, Friction Factor $= 0.0014 + (0.125/Re^{0.32})$	20	CO3
Q 11	a. Explain in detail the Government policy on petroleum product pricing. b. Discuss various marketing strategies used by companies to sell the petroleum products	10+10	CO4

END