UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, May 2022

Course: Petroleum Exploration   Semester: II
Program: M.Sc Petroleum Geoscience   Time   : 03 hrs.
Course Code: PEGS 7028   Max. Marks: 100

Instructions: All questions are compulsory in all the sections; however, internal choices are given in Q 7 (Section B) and Q 10 (Section C).
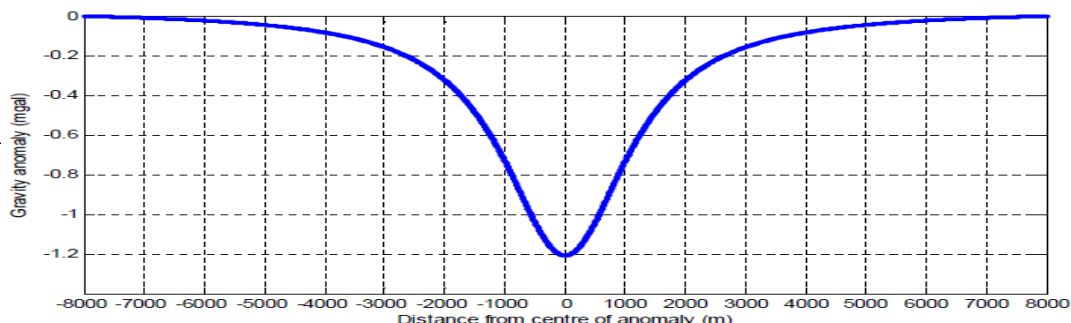
SECTION A
(5Q × 4M = 20Marks)

S. No.	Question	Marks	CO
Q 1	Explain the cause of Earth's Magnetism.	04	CO2
Q 2	Refer the Table 1, which presents Rock Eval Pyrolysis data. Calculate the production index, hydrogen index and oxygen index for the studied samples. **Table 1**	04	CO3
Q 3	Consider a gas reservoir, which has 20% porosity. From well logs, the following P-wave velocities werel determined: Sandstone 4.8 km/s, Water 305 km/s, Gas 0.3 km/s, Shale 2.4 km/s. Determine the average P-wave velocity in the water-saturated reservoir.	04	CO4
Q 4	Discuss the significance of Pre-acquisition consideration.	04	CO1
Q 5	Describe in brief about process of survey design.	04	CO1

Table 1

Sample No.	S1	S2	S3	TOC	Tmax
1	0.30	12.5	4.8	3.70	305
2	0.34	6.6	0.34	7.28	447
3	0.22	6.3	0.14	6.93	448
4	1.94	3.9	0.45	8.37	467

SECTION B
(4Q × 10M = 40 Marks)

S. No.	Question	Marks	CO
Q 6	Explain Magnetism in rocks and minerals.	10	CO2
Q 7	Critically examine different Geochemical methods of hydrocarbon prospecting. **Or** Explain the procedure for source rock evaluation.	10	CO3
Q 8	The following gravity anomaly profile (**Fig.1**) was recorded over a salt body. Salt has a density of 2100 kg/m^3. The surrounding rock has a density of 2800 kg/m^3. Considering the gravity anomaly caused by a salt body which can be approximated by a sphere, determine the depth of the centre and radius of the salt body.	10	CO2

		Fig. 1		
Q 9	Describe about P, S, Rayleigh and Love waves.		**10**	**CO4**
	SECTION-C **(2Q × 20M = 40 Marks)**			
Q 10	A seismic data acquisition company carried out geophysical survey in a basin and observed following P-wave velocities in three different layers as 4.1km/s, 6.8km/s and 3.5km/s respectively. Consider the amplitude of incident wave as unity and density of all the layers as 2700kg/m^3, depth to first and second interfaces are 600m and 1500m respectively and that there is no geometrical spreading, attenuation, or scattering. Construct the seismic record of amplitude versus time of the arrival of first three possible waves in the geophone. **OR** Seabird Exploration, a global provider for high-end seismic services, require doing a seismic survey for an oil company. As a global company, they want to ensure best quality results and for that, they believe in better acquisition. Therefore, they contacted you for designing the survey. Construct the report defining: Significance of survey design, Formation of database, Optimization of parameters and Type of spread.		**20**	**CO4**
11	Describe in detail about formation of petroleum w.r.t. geological processes, mention about all stages, genetic potential & transformation ratio, role of temperature, time and pressure.		**20**	**CO3**