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

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, July 2020

Course: Exploration Geophysics **Semester: IV**
Program: B.Tech. GIE, GSE & Mining Engg. **Time: Section A- 2hrs.**
Section B- 8hrs.
Course Code: PEGS 2007 & GSEG321 **Max. Marks: 100**

Instructions:

1. Read the instruction carefully before attempting QP. This question paper has two section, Section A and Section B.
2. Both section A & B have questions from entire syllabus. The COs mapping, internal choices within section is same as earlier.
3. There are total of **four** questions in this question paper. **One** in Section A and **three** in Section B
4. Section A consist of multiple choice/Multiple Answer/ TF questions and has the total **weightage of 60%**.
5. Section A will be conducted online on BB Collaborate platform. The maximum time allocated to Section A is **2Hrs**.
6. Section B consist of long answer based questions and has the total **weightage of 40%.**
7. Section B to be submitted within **8 hrs. from the scheduled time** (*exceptional provision due to extraordinary circumstance due to COVID-19 and due to internet connectivity issues in the far-flung areas*).
8. No submission of Section B shall be entertained after **12th July, 10:00 PM (IST)**.
9. Section A should be attempted before Section B and must be submitted within **2 hours** of start of examination.
10. Answers in Section B will be checked for Plagiarism (similarity), and maximum permissible limit is 15%, above that marks will be deducted accordingly.
11. The section B should be attempted in blank white sheets (hand written) with all the details like
    - Name of the student, Sap id
    - Programme, Semester,
    - Course name, Course code,

must be mentioned at the top (as in the format) and signature of student at the bottom (right hand side bottom corner). Any submission without above mention information is not acceptable, and hence will not be evaluated.

12. A final pdf file (single file only containing all the pages) of handwritten assignment (Section B) should be named as "Roll Number_Program_Semester_ESEdate", for example "R870007021_GSE_4_20July2020".

SECTION A

S. No.		**Marks**	**CO**
Q 1	Please find questions consist of multiple choice/Multiple Answer/ TF in table below.	**60**	**1, 2 & 3**

S. No.	Marks	Type	Q statement
1	1	MC	What properties determine how long it takes a sound wave to travel through a material?
2	1	MC	P-Waves are also said to be
3	1	MC	Of the three mentioned waves, which one is said to the most damaging to humans
4	1	MC	The first motion of an earthquake detected at a seismic station is
5	1	MA	Scope of Geophysics include study of (tick all that apply)
6	1	MC	For seismic S-wave velocity, V, the rigidity modulus, μ, is proportional to
7	2	MA	What happens when a seismic wave meets a surface of discontinuity within the Earth?
8	1	MC	Site Check includes Field operations, gridding & profiling with optimising resolution and cost
9	2	MA	List the factors that affect seismic velocity
10	1	MC	Surface waves are different from S waves in a sense they are
11	1	MC	How do rock particles move during the passage of a P wave through the rock?
12	2	MA	Types of Geophysical methods include
13	1	MC	The bulk modulus measures
14	1	MC	Which boundary marks a change from 100% solid to 100% liquid?
15	2	MA	Amplitude of seismic wave is affected by
16	1	MC	Electrical methods are helpful in identifying weathered zones.
17	1	MC	With increasing travel time the difference in arrival times between the P and the S waves
18	1	MC	Good evidence that the Earth has a layered structure is where seismic waves
19	2	MC	What will be velocity of shear wave if P wave velocity is 1.85 Km/s and poisson's ratio is 0.3 ?
20	2	MC	Consider a gas reservoir which has 12% porosity, average P-wave velocity is 2.2 Km/s, P-wave velocity in Shale is 2.4Km/s and in Sandstone is 4.5Km/s. What will be the velocity in the gas filled region?
21	2	MA	Mark all the factors that affect seismic velocities
22	1	MC	Which method utilizes dielectric constant to find anomaly
23	1	MC	The ratio Vp/Vs is independent of density and can be used to derive Poisson’s ratio, which is a much more diagnostic lithological indicator
24	1	MC	Rayleigh waves are non-dispersive in nature.
25	1	MC	Love waves have horizontal particle displacements, perpendicular to the direction of wave travel
26	1	MC	There will be a phase change of 180° in the phase of the reflected wave (a peak becomes a trough), called as Negative Polarity Reflection, occurs when
27	2	MC	Shape of the anomaly curve depends on
28	2	MA	Vertical resolution in seismic survey is controlled by (tick all that apply)
29	1	MC	What will be the Group interval in seismic survey if first Geophone is placed at 2m from source and far offset is 120m in a 24 channel system?
30	4	MC	Geometric factor for the arrangement given in XY plane as C1 (2, 14), C2 (2, 2), P1 (6, 8) & P2 (12, 8) is
31	4	MC	Apparent resistivity for a DC Resistivity survey if a current of 40mA passed through current electrodes separated by a distance of 80 m and a voltage of 6V measured across the potential electrodes separated by 20 m having same center as that of current electrode is

32	1	MA	Materials have a net magnetic moment due to
33	2	MC	Highest magnetic susceptibility is found in
34	2	MC	Earth's magnetic axis is inclined at an angle of _____ to Earth's rotational axis
35	2	MC	Isogonic maps represents contours of equal
36	2	MC	A gravity reading is taken in a stationary helicopter hovering 2 km above mean-sea level at a particular location. The difference in the value of g measured in the helicopter and at mean sea level vertically beneath the helicopter will be.
37	1	MC	Bouguer anomaly obtained after applying all necessary corrections is due to
38	1	MC	Considering all variables to be equal, Time period of a simple pendulum will be maximum at
39	1	MC	In seismic survey, removal of all periods shorter than Nyquist period is achieved by
40	2	MC	The maximum frequency at which a signal comprising of 30Hz, 50Hz and 70Hz frequencies should be sampled to avoid aliasing is

SECTION B

Q 2	Differentiate between working principle of Proton Precession and Fluxgate Magnetometers with neat schematic diagrams. **OR** Discuss Magnetic data acquisition and processing.	**5**	**CO3**
Q 3	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 waves in the geophone. **OR** Construct a detailed report of Survey design for 3D seismic data acquisition on land, that include description and optimization of all the parameters, survey geometry, types of spread, Pre-survey studies etc.	**15**	**CO4**
Q4	A service provider company Prayaas Explorations has hired you for Exploration in East India along a shear zone. There are geological reports available around this region, which depicts the possibility of multiple mineralization along this zone. Some groundwater studies has reported presence of Uranium at shallow levels. After multiple geophysical methods to explore various mineral zones you are now required to provide a detailed survey report stating, a) Planning of exploration or geophysical survey. (4 marks)	**20**	**CO4**

	b) Various methods utilized and their significance. (2 marks) c) Rationale of choosing particular method and the output obtained from them. (4 marks) d) Data acquisition including optimization of parameters etc. (6 marks) e) Concluding remarks. (4 marks)		