KURUKSHETRA UNIVERSITY, KURUKSHETRA (Established by state legislature Act XII of 1956) ('A++' Grade, NAAC Accredited)



Scheme of Examination and Syllabus for Under-Graduate Programme (Multidisciplinary) Subject: <u>Geophysics</u>

Under Multiple Entry-Exit, Internship and CBCS-LOCF in accordance to NEP-2020 w.e.f. 2025-26 (in phased manner)

KURUKSHETRA UNIVERSITY, KURUKSHETRA (Established by the State Legislature Act XII of 1956) ('A++' Grade, NAAC Accredited Scheme of Examination for Under-Graduate Programme Under Multiple Entry-Exit, Internship and CBCS-LOCF in accordance to NEP-2020 w.e.f. 2025-26 (in phased manner) Subject: Geophysics

Remarks	Course	Course	Nomenclature	Credits	Contact	Internal	End	Total	Duration
	Туре	Code	of paper		Hours/	Marks	Term	Marks	Of
					Week		Marks		Exam
			S	EMESTE	R-I				
Scheme	CC-1	B25-	Dynamics of	3	3	20	50	70	3 hrs.
Α	(4	GPH-	the Earth						
	credit)	101	Practical	1	2	10	20	30	3 hrs.
SEMESTER-II									
Scheme	CC-2	B25-	Geophysical	3	3	20	50	70	3 hrs.
Α	(4	GPH-	Exploration						
	credit)	201	Practical	1	2	10	20	30	3 hrs.

(First Year)

(Second Year)

Remarks	Course	Course	Nomenclature	Credits	Contact	Internal	End	Total	Duration
	Туре	Code	of paper		Hours/	Marks	Term	Marks	Of
					Week		Marks		Exam
	SEMESTER-III								
Scheme	CC-3	B25-	Hydrogeophysics	3	3	20	50	70	3 hrs.
Α	(4	GPH-	Practical	1	2	10	20	30	3 hrs.
	credit)	301							
	SEMESTER-IV								
Scheme	CC-4	B25-	Earthquake	3	3	20	50	70	3 hrs.
Α	(4	GPH-	science						
	credit)	401		1	2	10	20	30	3 hrs.

Remarks	Course	Course	Nomenclature	Credits	Contact	Internal	End	Total	Duration
	Туре	Code	of paper	010000	Hours/	Marks	Term	Marks	Of
					Week		Marks		Exam
	SEMESTER-V								
Scheme	CC-5	B25-	Geospatial	3	3	20	50	70	3 hrs.
Α	(4	GPH-	Technology						
	credit)	501	Practical	1	2	10	20	30	3 hrs.
	SEMESTER-VI								
Scheme	CC-6	B25-	Geohazards	3	3	20	50	70	3 hrs.
Α	(4	GPH-	Practical	1	2	10	20	30	3 hrs.
	credit)	601							

(Third Year)

Session: 2025-26						
Part A - Introduction						
Subject	Geophysics					
Semester	1					
Name of the Course	Dynamics of the Eart	h				
Course Code	B25-GPH-101					
CourseType: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/VAC)	CC-1					
Level of the course (As per Annexure-I	100-199					
Pre-requisite for the course (ifany)	None					
CourseLearningOutcomes(CLO): After completing this course, the learner will be able to:						
 To understand the formation of solar system and Earth evolution ofplate tectonics and dynamism of Earth To learn about interior of the Earth and variation of physical parameters with depth. To understand about gravity and magnetic fields of the earth and its variation. Gain knowledge about seismology and its relation with dynamics of major plates and formation of Himala 						
CLO5 is related to practical component 5. Understand how the age of Earth is determined and how various physical parameters vary with depth.						
Credits	Theory	Practical	Total			
	3	1	4			
Contact Hours	Contact Hours 3 2 5					
Max. Marks: 100 Time: 3 Hrs. Internal Assessment Marks: 30 End Term Exam Marks: 70						
Part B- Contents of the Course						
Instructions for Paper- Setter						

Question No. 1 is compulsory and covers entire syllabus. In addition to Question No. 1 there will be eight (8) questions, two (2) from each unit. A candidate must answer four (4) more questions, selecting one (1) question from each unit. All questions carry equal marks.

Unit	Topics	Contact
		hours
Ι	Introduction to the Geophysics: Origin, development, definition, scope,	12
	uses and limitation. Origin and age of Earth and Solar System, Kepler's	
	law of planetary motion, Evolution of the Earth, Continental drift and sea	
	floor spreading, Plate tectonics theory and interactions of different type	
	of plate boundaries	

II	Theory of Elasticity, Hooke's law, elastic, anelastic and plas brittle and ductile behavior, types of seismic waves, stru Earth, variation of seismic velocity, density, tempor pressure from surface to center of the Earth.	tic materials, acture of the erature, and	11			
III	The gravity field of the Earth, variation of gravity, me gravity, shape and size of the Earth, Evolution, structure and of Earth's atmosphere,Geomagnetism: origin of earth's m and its variations.	asurement of composition agnetic field	11			
IV	Characteristics of earthquakes: origin, distribution, causes Types of Earthquakes, Measurements of earthquakes, Glob Geodynamics of the Indian plate, Origin and tectonics of Hin	and hazards. al seismicity, nalayas.	11			
	Practicum					
V	 Visit of seismological observatory of Deptt. of Geo Anatomy of seismograms Estimation of epicentral distance Velocity estimation using Distance-Time data for o Magnetic poles movement Construction of maps of Tectonic plates, continent sea floor spreading 	30				
	Suggested Evaluation Methods					
	Internal Assassment: 30	End Torm I	Examination: 70			
 The C. Se M Pra C. Se M 	y: 50 marks cum: 20 marks					
	Part C-Learning Resources					
 Recommended Books/e-resources/LMS: Lowrie, W., Fundamentals of Geophysics, 2nd Edition, Cambridge University Press, 2007. Lillie, R. J., Whole Earth Geophysics: An introduction textbook for geologist and geophysicists, Prentice Hall, New Jersey. Davies, G. F., Dynamic Earth: Plates, Plumes and Mantle Convection, Cambridge University Press, 2000. Fowler, C. M. R., The Solid Earth: An introduction to global Geophysics, 2nd Edition, Cambridge, University Press, 2004. Stacey, F. D., and Davis, P., Physics of the Earth, 4th Edition, Cambridge University Press, 2008. Bott, M. H. P., The interior of the Earth, 2nd Edition, Edward Arnold, London, 1982. 						

Session: 2025-26						
Part A - Introduction						
Subject	Geophysics					
Semester	II					
Name of the Course	Geophysical Explorat	tion				
Course Code	B25-GPH-201					
CourseType: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/VAC)	CC-2					
Level of the course (As per Annexure-I	100 - 199					
Pre-requisite for the course (ifany)	None					
CourseLearningOutcomes(CLO):	 After completing this course, the learner will be able to: 1. Know aboutGeophysics and geophysical methods with their applications. 2. To impart the knowledge about the basic concepts of potential field methods (gravity & magnetic) along w their importance and applications in geophysical exploration. 3. To understand the various electrical method and basics of acquisition processing and interpretation. 4. To impart the knowledge about the fundamentals and applications of acismic method. 					
CLO5 is related to practical component	5. To impart the practical knowledge about the various techniques used in geophysics.					
Credits	Theory	Practical	Total			
	3	1	4			
Contact Hours	3	2	5			
Max. Marks: 100			Time: 3 Hrs.			
End Term Exam Marks: 70						
Part B-Contents of the Course						
Instructions for Paper- Setter						

Question No. 1 is compulsory and covers entire syllabus. In addition to Question No. 1 there will be eight (8) questions, two (2) from each unit. A candidate must answer four (4) more questions, selecting one (1) question from each unit. All questions carry equal marks.

Unit	Topics	Contact hours
Ι	Basics of Geophysical Exploration, Types of Geophysical methods, various physical parameters in Geophysical Exploration, Application of	12
	Geophysical methods for society	

П	Potential Methods: brief about geophysical fields introduction to	11				
	gravity method gravitation reduction of gravity data gravity					
	anomaly: housing and free air applications of gravity method Farth					
	anomary. bouguer and nee-an , applications of gravity method, Early magnetic field erigin of	2				
	magnetic field, components of magnetic fields magnetism in reals					
	geomagnetism, variation of magnetic fields, magnetism in rocks	,				
	application of magnetic method	11				
111	Electrical Method: Introduction to resistance and conductance, resistivity					
	and conductivity, electrical properties of rocks, electrode configurations	,				
	profiling and sounding, introduction about self-potential and induced					
	potential, Electromagnetic methods: origin and measurements					
	Application of Electrical methods for society,					
IV	Seismic method: basic principles: Snell's law, Fermat Principle, Huygens	s 11				
	principle, Reflection, refraction, diffraction, seismic waves, expression of	f				
	seismic velocity, Factors affecting wave velocities in rocks, seismic					
	velocity in rocks, application of seismic methods in society:Oi					
	Exploration, Mining and Engineering					
	Practicum					
V	1. Exposure to the geophysical instruments	30				
	2. Measurement of absolute value of gravity					
	3. Estimation of magnetic field components					
	4. Estimation of velocity using refraction data					
	5. Estimation of velocity using reflection data					
	6 Estimation of resistivity using electrical data					
	Suggested Evaluation Methods					
	Internal Assessment: 30 Fnd Term Fy	vamination · 70				
🕨 The	orv (20 marks) • Theorem	v 50 marks				
• C	lass Participation: 5 marks	y • 50 marks				
• Se	eminar/presentation/assignment/quiz/class test etc.: 5					
mar	ks					
• M	id-Term Exam: 10 marks • Pract	icum: 20 marks				
Dro	ation: (10 morks)	cum 20 marks				
• C	lass Participation: Nil					
• 56 Mai	eminar/Demonstration/viva-voce/Lab records etc.: 10					
Ivial	KS					
• 1	id-Term exam: Nil					
	Part C-Learning Resources					
Recomm	nended Books/e-resources/LMS:					
•	• The Solid Earth by C.M.R. Fowler					
•						
•						
•	Applied Geophysics: W. M. Telford, L. P. Geldart, R. E. Sheriff					
•	Introduction to Geophysical Exploration: Keary& Brooks					
•	• An Introduction to Geophysical Exploration by Philip Kearey, Michael Brooks, Ian Hill					