KURUKSHETRA UNIVERSITY
KURUKSHETRA

Syllabus for

Under-Graduate Programme (Multidisciplinary)

Subject: Geology

(semester V & VI)

Under Multiple Entry-Exit, Internship and CBCS-LOCF in accordance to NEP-2020 w.e.f. 2024-25

Session: 2024-25			
Part A - Introduction			
Subject	Geology		
Semester	V		
Name of the Course	GIS and Remote Sensing		
Course Code	B23-GGY-501		
Course Type: (CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/VAC)	CC-5		
Level of the course (As per Annexure-I)	300-399		
Pre-requisite for the course (if any)	N.A.		
Course Learning Outcomes (CLO):	After completing this course, the learner will be able to: 1. Understand basic concepts of Remote sensing. 2. Understand basic concepts of Aerial photographs. 3. Learn about components of GIS. 4. Understand GIS data models. 5*. Learn to read arial photographs and google earth imagery, basic GIS software.		
Credits	Theory	Practical	Total
	3	1	4
Contact Hours	3	2	5
Max. Marks: 100 (70 Th.+ 30 Pr.) **Internal Assessment Marks: 30 (20 Th.+ 10 Pr.)** **End Term Exam Marks: 70 (50 Th.+ 20 Pr.)**		**Exam Time: 03 Hrs.**	

Part B- Contents of the Course

Instructions for Paper- Setter

Question No. 1 is compulsory and comprising short answer type questions spread over the entire syllabus, to be answered in 15-20 words. In addition to Question No. 1, there will be eight (08) questions, two (02) from each unit. A candidate has to answer four (04) questions, selecting at least one (01) question from each unit. All questions carry equal marks.

Unit	Topics	Contact Hours
I	Remote sensing - concept; Sources of remote sensing information; electromagnetic energy and spectrum; Remote sensing platforms; Atmospheric effects - absorption bands; Scale, brightness and tone, contrast ratio, spatial resolution and resolving power; Detectability, recognizability, signature, texture and interpretation key.	11

II	Atmospheric scattering; ground resolution; Photographic scale; Relief displacement, vertical exaggeration; Aerial photographs - their types and uses.	11
III	GIS Definition and its Components: Computer hardware and software module, data, people and methods; Historical development and organizational aspects of GIS; GIS as a science and technology. Role of GIS in Geology.	12
IV	GIS data models; Raster data models, vector data models, comparison with advantages and disadvantages of raster and vector data models; Spatial data structure: vector and raster; Basic concept data and information; Database and its types; Database management system.	11
V*	Aerial Photography; Google earth imagery; Spatial data input in GIS format- scanning and georeferencing; Digitization and creation of layers: point, line and polygon.	30

Suggested Evaluation Methods

Internal Assessment: ➢ **Theory** • Class Participation: **05 marks** • Seminar/presentation/assignment/quiz/class test etc.: **05 marks** • Mid-Term Exam: **10 marks** ➢ **Practicum** • Class Participation: **NIL** • Seminar/Demonstration/Viva-voce/Lab records etc.: **10 marks** • Mid-Term Exam: **NIL**	**End Term Examination:** **50** **20**

Part C-Learning Resources

Recommended Books/e-resources/LMS:

- Demers, M.N., 1997. Fundamentals of Geographic Information System, John Wiley & sons. Inc.
- J. Collins, B. Hoffmann-Wellenhof and H. Lichtenegger, 2001. GPS: Theory & Practice, Springer Wien New York.
- Jensen, J.R., 1996. Introductory Digital Image Processing: A Remote Sensing Perspective, Springer- Verlag.
- Lillesand, T. M. & Kiefer, R.W., 2007. Remote Sensing and Image Interpretation, Wiley.
- Richards, J.A. and Jia, X., 1999. Remote Sensing Digital Image Analysis, Springer-Verlag.

Session: 2024-25			
Part A - Introduction			
Subject	Geology		
Semester	VI		
Name of the Course	Hydrogeology		
Course Code	B23-GGY-601		
Course Type: (CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/VAC)	CC-6/CC-M6		
Level of the course (As per Annexure-I)	300-399		
Pre-requisite for the course (if any)	N.A.		
Course Learning Outcomes (CLO):	After completing this course, the learner will be able to: 1. Understanding of basic concepts of hydrogeology. 2. Understand the availability and occurrence of groundwater. 3. Understand about different types of wells and quality of groundwater. 4. Learn groundwater management. 5*. Learn the calculation of physical parameters of water.		
Credits	Theory	Practical	Total
	3	1	4
Contact Hours	3	2	5
Max. Marks: 100 (70 Th.+ 30 Pr.) **Internal Assessment Marks: 30 (20 Th.+ 10 Pr.)** **End Term Exam Marks: 70 (50 Th.+ 20 Pr.)**		**Exam Time: 03 Hrs.**	

Part B- Contents of the Course

Instructions for Paper- Setter

Question No. 1 is compulsory and comprising short answer type questions spread over the entire syllabus, to be answered in 15-20 words. In addition to Question No. 1, there will be eight (08) questions, two (02) from each unit. A candidate has to answer four (04) questions, selecting at least one (01) question from each unit. All questions carry equal marks.

Unit	Topics	Contact Hours
I	Basic concept, scope of hydrogeology and its relevance to the society; Introduction to hydrometeorological parameters: precipitation, evaporation, evapotranspiration, infiltration, runoff; Hydrologic cycle; Distribution of water on earth.	11

II	Occurrence of groundwater; Water bearing formations: classification and their characteristics; Classification of aquifers; Springs; Hydrogeological parameters: porosity, permeability, storage coefficient and transmissivity; Darcy's law.	11
III	Water wells: dug wells, bored wells, driven wells and jetted wells; Water well drilling methods; Groundwater quality criteria for different uses; Contamination of groundwater; Groundwater exploration methods: Geochemical and surface Geophysical methods.	12
IV	Conjunctive use and groundwater management; Water-logging and relative problems; Exploration and evaluation of groundwater potential; Rain water harvesting; Artificial recharge of groundwater.	11
V*	Calculation of TDS; Calculating physical parameters of water- pH, turbidity, odor and colour, etc. Numerical based on Darcy law and Water balance equation.	30

Suggested Evaluation Methods

Internal Assessment: ➢ **Theory** • Class Participation: **05 marks** • Seminar/presentation/assignment/quiz/class test etc.: **05 marks** • Mid-Term Exam: **10 marks** ➢ **Practicum** • Class Participation: **NIL** • Seminar/Demonstration/Viva-voce/Lab records etc.: **10 marks** • Mid-Term Exam: **NIL**	**End Term Examination:** **50** **20**

Part C-Learning Resources

Recommended Books/e-resources/LMS:

- Todd, D.K. and Mays, L.W., 2004. Groundwater hydrology. John Wiley & Sons.
- Bowen, R., 1986. Groundwater. Springer Science & Business Media.
- Fetter, Charles Willard. Applied hydrogeology. Waveland Press, 2018.
- McWhorter, D.B. and Sunada, D.K., 1977. Ground-water hydrology and hydraulics. Water Resources Publication.