University of Kalyani

Department of Geography

SYLLABUS

for

RESEARCH ENTRANCE TEST (RET) IN GEOGRAPHY

(With Effect From: 2021)

Department of Geography

University of Kalyani

Kalyani, Nadia-741235, West Bengal

UNIVERSITY OF KALYANI

DEPARTMENT OF GEOGRAPHY

Syllabus of RET in Geography

With Effect From : 2021

Paper Code	Unit	Full Marks
KU/GEO/RET/01	Unit-I: Research Methodology	25
	Unit-II: Geography (Subject Specific)	25
Total		50

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DEPARTMENT OF GEOGRAPHY

Syllabus for RET in Geography,

With Effect From: 2021

Paper Code – KU/GEO/RET/01

Unit	Contents
Unit-I: Research Methodology (Full Marks: 25)	Spectrum of geographical research and its approaches: inductive and deductive, objective and subjective; Importance of literature review in defining a problem and identification of research gap; Development of hypothesis and establishment of working hypothesis; Identification of the research problem; Abstract, summery and synopsis; Objectives of geographical research; Research methodology, methods and techniques; Methods of sampling and sample design; Preparation of research schedule and field book; Approaches to research: case study, comparison, definition, descriptive, evaluative, exploratory, interpretive, narrative, persuasive, policy memorandum, participatory and action research; Primary and secondary data sources; Methods of data collection; Data collection – instrumental survey; Methodological orientation: quantitative, qualitative and mixed; Application of cartographic techniques in geographical research; Application of statistical techniques in geographical research; Application of Remote Sensing and GIS in geographical research; Critical issues in major areas of geographical research: physical and human; Structure and components of research reports; Technical reports and thesis; Bibliography, referencing style, footnotes and endnotes; Research ethics and plagiarism

Unit-II: Geography (Subject Specific) (Full Marks: 25)	**GEOTECTONICS AND GEOMORPHOLOGY:** Earth's tectonic and structural evolution with reference to geological time scale; Earth's interior with special reference to seismology; Earth crust; Characteristics of major rocks and minerals; Concept and theories of isostasy; Concept of geomagnetism and palaeomagnetism; Continental drift; Plate tectonics as a unified theory of global tectonics; Earthquakes and vulcanicity; Mountain building theories; Endogenetic and Exogenetic forces; Types of folds and faults; Concepts in Geomorphology: spatial scale, temporal scale, systems, feedback, equilibrium and threshold; Tectonics and geomorphology: Influence of tectonics in landscape evolution; Mass wasting and weathering; Catchment process and fluvial processes; Factors regulating entrainment, transportation and deposition; Adjustment of channel forms and patterns to morphodynamic variables; Linear properties of drainage basin: river network, stream orders, law of stream numbering – Horton and Strahler, stream length, type of links, number of links, TDCN, TICN, drainage pattern; Initiation of channel: theory of overland flow, theory of sub-surface flow; Areal properties of drainage basin: size and shape, influence of basin shape on hydrological regime, law of basin area, stream frequency, drainage density; Altitudinal properties of drainage basin: relief, slope, law of stream slope, ruggedness; Drainage pattern evolution, importance of headward extension and branching, lateral expansion; Evolution of landforms (erosional and depositional): fluvial, karst, aeolian, glacial, periglacial and coastal; Development of river network and landforms on uniclinal and folded structures; Models of landscape evolution: cyclic and non-cyclic; Elements of slope and different approaches to study slope development **HYDROLOGY AND MANAGEMENT OF WATER RESOURCES:** Global hydrological cycle: concept and significance; Aquifers: types and issues related to overutilization; Principles of groundwater: storage, movement and discharge; Concept of basin hydrology and run off cycle; Unit hydrograph, rating curve and their applications; Consumptive and non-consumptive water use;

	Fresh water crisis – issues and management; Concept of integrated water resources management; Parameters and standards of water quality, water quality monitoring; Storm water and flood management: storm water management, design of drainage system, flood routing through channels and reservoir, flood control and reservoir operation; Drought management**:** drought assessment and classification, drought analysis techniques, drought mitigation planning; Methods of water conservation: rainwater harvesting and watershed management **CLIMATOLOGY:** Nature, composition and layering of the atmosphere; Insolation and heat budget; Horizontal and vertical distribution of temperature; Inversion of temperature; Adiabatic processes; Atmospheric stability and instability; Condensation and precipitation; Theories of cloud formation; Air-masses and Fronts, Jet-stream; Tri-cellular model; Pressure and planetary winds; Local winds; Tropical and mid-latitude cyclones, anticyclone; Thunderstorm, Hailstorm, Dust storm, Cloudburst, Heat and Cold waves; Monsoon: theories of its origin, burst of the monsoon, MONEX; Recent trends of monsoon in Indian subcontinent; El Nino, Southern Oscillation and La Nina; Climatic classification; Weather forecasting: short, medium and long range **SOIL GEOGRAPHY:** Concept of soil and soil forming factors; Soil profile; Pedon and polypedon; Soil catena; Physical and chemical properties of soil; Soil forming processes; Soil taxonomy and world pattern of soils; Soil nutrients; Soil organisms; Micro-organisms and their relation with soil fertility;

	Management of saline and Alkaline soil; Integrated management of soil; Concept of land and land use **BIOGEOGRAPHY:** Habitat, Ecosystem, Ecology, Biome, Biosphere; Bio-geo-chemical cycles; Energy flow and balance of energy in the biosphere; Plant ecology: Concept of Adaptation, Succession and Climax; Impact of climate and soil on distribution of plants; Means and barriers of dispersal and migration of animals; Significance of Germplasm; Biodiversity and related issues; International Biological Programme; Man and Biosphere Programme; Ecological system of the earth – atmosphere, lithosphere, hydrosphere and biosphere **GEOGRAPHICAL THOUGHT:** Place of Geography in the classification of knowledge after Varenius and Kant; Contributions of Greek, Roman, Indian scholars during the ancient period and Arab scholars during the medieval period; Contributions of Humboldt and Ritter in Geography; Development of Professional Geography and Schools of Geographical thought; Social Darwinism and its importance in Geography; Morphology of cultural landscape (Carl O. Sauer); Major paradigms in Geography and their shift; Dualism and Dichotomies in Geography: Ideographic and Nomothetic approach, Physical and Human Geography, Regional and Systematic Geography; Positivism and Quantitative revolution in Geography; Hartshorne-Schaefer debate; System approach in Geography; Humanistic Geography, Radical Geography, Behavioural Geography; Welfare Geography, Feminism and Feminist Geography; Critical Geography; Postmodernism and Postmodern Geography; Subaltern studies in Geography **POLITICAL AND HISTORICAL GEOGRAPHY:** Geographical perspectives on formation of State; Concept of State after Ratzel and Marx; Nation-state, City-state; Colonialism, Imperialism and Federalism in understanding core-periphery

	relationship; Concept of Geopolitics; Geopolitical significance of international water disputes: India and its neighbouring countries; Geopolitics of energy resources; Concept of Electoral Geography; Approaches to the study of Electoral Politics: Areal and Spatial Behavioural approaches; Spatial organization of electoral areas and the geography of representation, Gerrymanderism; Historical Geography and Historiography; Ancient period: Territorial organization of *JANAPADAS* in India; Agriculture, industry, trade and urbanization under the Mughal Empire; Plantation farming and textile industry during Colonial India; Importance of gateway cities and port orientation of transport lines; Post-colonial urbanization in India, Deterritorialisation for the formation of new Provinces in India after Independence **POPULATION GEOGRAPHY:** Changing approaches to Population Geography; Population Geography as distinct from Demography; Sources of population data; Factors of population growth; Types of migration; Theories of population growth: Malthusian, Marxian, Neo-Malthusian; Factors controlling fertility, mortality and migration; Demographic Transition Model; Limits to growth; Population composition and characteristics (age-sex, rural-urban, occupational structure and educational levels); Population policies – Pro and Anti Natal; Comparative study of population policies: India, China and Sweden **SETTLEMENT GEOGRAPHY:** Concept of Ekistics; Study on settlement system and hierarchies; Census categories of settlements in India; Rural-urban dichotomy and interaction; Types, pattern and segregation of rural settlements in India; Urban settlements and their classification: functional and census; Urbanization in India as multi-dimensional process; Megalopolis, Ecumenopolis and Nacropolis; Urban Sprawl, Urban redevelopment and renewal in Indian context

GEOGRAPHY OF HAZARDS AND DISASTERS:

Concept and types of natural hazards and disasters;
Assessment of risk and vulnerability;
Concepts of hazard and disaster management;
Marine hazard: tsunami;
Hydrological hazards: flood and drought;
Nuclear hazard and radio-active contamination;
Lead and plastic hazards;
Arsenic and fluoride contaminations;
CFC hazards and depletion of ozone layer;
Social hazards: poverty – income and nutritional poverty line; crime – juvenile and adult, domestic and outdoor; disease – endemic, epidemic and pandemic; war – civil and international

SOCIAL GEOGRAPHY AND CULTURAL GEOGRAPHY:

Definition and relevant terms in Social and Cultural Geography;
Concepts of culture and society;
Concept of space: place, space and locale, material and social perspectives of space;
Social structure and social processes;
Social mobility;
Social distance, social isolation, social exclusion and inclusion;
Geography of inequality: race, ethnicity and gender, class and caste; spatial – international, regional and intra-urban
Emergence of ethnic geography: ethnic neighbourhood and ghetto; Ethno-ecology of Particularly Vulnerable Tribal Groups (PVTGs) in India;
Human ecology of diseases and emergence of Medical Geography;
Disease Ecology;
Welfare Geography: Social well-being, HDI, GEM;
Culture as a geographical and societal process;
Cultural hearth and cultural realm, cultural diffusion and assimilation, mosaic of culture, acculturation and detribalisation;
Spatial distribution of social groups in India (Tribe, Caste, Religion and Language);
Cultural regions;
Globalization and Cultural Ecology;
Health Care Planning and Policies in India;
Medical Tourism in India

ECONOMIC GEOGRAPHY:

Economic and environmental perspective of resource, scarcity of natural resources and their management;
World energy crisis in developed and developing countries;

	Concept of agricultural region; Concept and measurement of agricultural productivity and efficiency; Concepts of industrial region and industrial complex; Growth of IT industry in India; Concept of Digital Divide; Knowledge Production (Education and R&D) industries; Liberalization, Privatization and Globalization with their impact on industry and trade; Theories and models of spatial interaction (Edward Ullman and M.E.Hurst); Concept and measures of distance, accessibility and connectivity; Transport cost: factors and comparative cost advantages; Concept of Ring road, By-pass, Highways, Golden Quadrilateral, Dedicated corridors – North-South and East-West; From Export Processing Zone (EPZ) to Special Economic Zone (SEZ); Exclusive Economic Zone (EEZ), Forward trading and E-commerce; Role of GATT and WTO in international trade; Issues related to FDI in India's retail sector **AGRICULTURAL GEOGRAPHY:** Approaches to the study of Agricultural Geography; Determinants of agricultural profile: physical and non-physical determinants; Concept of sustainable agriculture and integrated farming systems; Significance of mixed farming; Agricultural region: concept and evolution; Techniques and methods of agricultural regionalization; Agricultural systems of the world after Whittlesey; Models in agriculture: von Thunen and Stamp; Acquisition of arable land with reference to India: issues and options; Possible impact of climate change on agriculture; Concept of agricultural carbon credits; Application of biotechnology in agriculture – GM crops: issues and implications; Role of agro-chemicals, bio-fertilizers and bio-pesticides in agriculture; Concept and methods of alternative agriculture; Application of nanotechnology in agriculture: issues and options; Concept of precision agriculture; Child labour in agriculture: issues and challenges; Gender issues in agriculture; Global Hunger Index and World patterns of hunger; Agricultural regions of India: types and salient features; Agricultural revolution in India - Green, White and Yellow; Impact of new economic policy and information technology on Indian agriculture; Impact of MGNREGA on Indian agriculture; Agricultural policies of India since independence;

	Food and nutrition security in India; Role of Public Distribution System (PDS) in assuring food security in India; Farmers indebtedness and its fall out in India; Agrarian distress in India: causes and possible remedies; Agro-climatic regions of West Bengal: types and characteristics; Broad pattern of land utilisation in West Bengal; Implications of land reforms in West Bengal; Changing agricultural profile of West Bengal: cropping intensity, cropping pattern, crop concentration, crop combination, crop diversification and crop productivity; Dairy development in West Bengal: issues and options; Organic farming in West Bengal; Agricultural marketing in West Bengal; Scope of food processing industry in West Bengal; Agrarian crisis in West Bengal: nature and possible solutions; Data collection techniques in Agricultural Geography: primary and secondary; Agriculture Census in India; Crop calendar; Cropping intensity, cropping incidence and cropping pattern; Crop diversification index after Gibbs-Martin; Crop productivity index after Enyedi and Shafi; Crop concentration index after Bhatia; Crop combination analysis after Weaver, Doi and Rafiullah; Measurement of land capability and soil fertility **ENVIRONMENTAL GEOGRAPHY:** Definition of relevant terms in Environmental Geography; Resource-population relationship; Ecosystem approach in Environmental studies; Gaia-hypothesis, Spaceship earth, Deep ecology, Environmentalism in Geography; Organismic and Holistic explanations; Population equilibrium, Optimum population and Land-man ratio; Stationary state economy; Environmental system, Environmental balance and Environmental degradation; Types and significance of worldwide contemporary major environmental issues; Millennium Development Goals; Sustainable Development and Sustainable development goals; IUCN, UNDP, UNEP, IPCC, UNFCCC, COP; Earth summits: 1972, 1992, and 2012; Parris Conference – 2015; Protocols: Montreal and Kyoto; Agro forestry, Social forestry and JFM; Use and misuse of forest resources and forest conservation;

	Wildlife conservation and management: Sanctuaries, National Parks and Biosphere Reserves w.r.t. India; Dams and development – displacement and rehabilitation issues; Environmental movements in India; Environmental Impact Assessment and Environmental Management Planning; Environmental Performance Index and Environmental audit; Tourism industry and environment: issues and challenges; Eco-tourism; Environmental migration; Global resource scarcity with special reference to food and fresh water; Environmental pollution with reference to E-waste and other non-degradable waste products; India's urban environment and sustainable transportation; Brown vs. Green technology and green economy; Renewable energy and recycle; Environmental ethics, policies and laws in India with special reference to air, water and forest; Environmental rating; Measurement of air pollutants; Noise pollution and its measurement; Determination of acidity and alkalinity of water; TSS and TDS in water; BOD and Total Hardness of water **URBAN GEOGRAPHY:** Concept of urban, urbanism and urbanization; Emergence of Urban Geography as a discipline: changing approaches and methodological foundations; History of urbanization in India; Concepts of urban region: City Region, Metropolis and Conurbation; Concepts of Megacity, Planned Towns, New Towns, Satellite Towns, Green/ Garden Cities, Sister Towns, Edge Cities; Changing urban forms: urban corridor, rural-urban fringe, counter-urbanization; Urban as a system: city-size distribution (Zipf and Berry) and urban primacy; Perception of urban-rural continuum; Delineation of functional and planning regions in Urban Arena – typologies and significances; Urban hierarchy and spacing after Christaller and Philbrick; Urban morphology: Models of Burgess, Homer Hoyt and Harris and Ullman; Peri urban model – Sinclair; Role of urban hierarchy in regional planning; Significance of urban hierarchy in India;

	Social segregation in the city; Urban social area analysis after Shevky and Bell; Contemporary city ecology; Patterns and process of urbanization in Independent India and their recent trends; Urban space: CBD, neighbourhood and communities; Impact of migration on the socio-economic structure of a specific urban area: Rural to urban, urban to urban and urban to rural migration; Gentrification–concept, theories and impact analysis; Concept of economic marginalization and reasons behind the proliferation of slums in urban India; Urban economy: basic and non basic, formal and informal; Types of urban linkages and its significance in regional planning; Development of migration-linkages in India during post-independence phase; Pollution and health degradation in metropolitan India; Sanitation and sewerage related problems in Indian cities – recent initiatives for development; Urban transport system and its associated problems with special reference to mass transit and para-transit in Indian megacities: strategies and solution; Analysis of urban housing policies in India: its problems and prospects; The city's ecological footprint, Urban Livability Index with reference to India; Urban development and planning in India: IDSMT, JNNURM, AMRUT and Smart City; Application of Remote Sensing and GIS in urban planning and management in India Sphere of Influence by Gravity Model, Break-point analysis and Population potential surface; Analysis of Regional Disparity after Sopher; Rank-size Distribution of Towns after Zipf and Pareto (Normal and Log/log); Weighted Score and Combination Analysis; Connectivity Mapping by Alpha, Beta and Gamma Index, Network Analysis by König /Associated Number and Cyclomatic Number; Accessibility Development by Detour Index, Measurement of Transport Accessibility by Shortest Path Matrix after Shimbel and Distance Flow Matrix; Urban Growth Index and Decadal Growth Rate; Urban Growth by Time Series Analysis in Least Square and Moving Mean Method; Index of Urbanization, Urban Intensity Index, Urban Density Distribution by Standard Deviation and Quartile Deviation Method; Urban Occupational Diversities and Specialization (Nelson and Harris); Urban Flow Analysis: Dependent and Independent Flow; Quality of Life Index for urban residential areas

	REGIONAL GEOGRAPHY : Concept of region and regional hierarchy; Regional typology: Delineation and significances of formal, functional and planning regions; Basic principles of regional planning; Techniques of regionalization; Theories of regional development (Albert O. Hirschman, Gunnar Myrdal, John Friedman); Growth pole, concept of growth foci and service centre; Concept of balanced and imbalanced development; Agro-politan approach in development; Regional disparity and diversity in India; Role of SGSY and MGNREGA in rural development in India; World regional disparities; Concept of multilevel planning in India: Local, regional and national level planning; Physical Geography of India: geology, physiographic division, zones of soil, natural vegetation, and climate; Resources base of India: coastal and marine resources, water resource region, mineral and power resources, major agricultural and industrial regions; Population of India: distribution, growth, structure and policy; Physical Geography of West Bengal: delineation of geographical regions and identification of development bottlenecks; Regional status of Human Development and their constraints: India and West Bengal; Selected regions for planning and management: flood prone and drought prone areas; Regional planning and developmental issues in North-East India and Damodar Valley regions; Regional planning and developmental issues in Indian Sunderban delta; Socio-economic development potentialities of Nadia and Murshidabad districts **QUANTITATIVE TECHNIQUES IN GEOGRAPHY:** Types and sources of data; Sampling techniques for geographical analysis; Histogram, Frequency distribution, Cumulative Frequency; Central Tendency: Mean, Median, Mode, Partition Values; Measures of Dispersion: Range, Mean Deviation, Standard Deviation, Coefficient of Variation; Location of Mean Centre of population and shift over time; Scatter diagram; Correlation: Pearson's Product-Moment Correlation; Spearman's Rank Correlation; Bivariate Regression Analysis: linear and exponential; Time Series Analysis; Sampling and probability distribution measures;

	Normal Distribution, Skewness and Kurtosis; Hypothesis Testing: t-test, z-test, Chi-square test and ANOVA; Matrix Algebra; Location Quotient and Lorentz Curve; Principal Component Analysis and Cluster Analysis **TOPOSHEET INTERPRETATION AND FLUVIAL MORPHOMETRY:** Principle of topographical map numbering system; Profile drawing and analysis: serial, superimposed, projected and composite, longitudinal or valley thalweg; Interpretation: structure, relief, drainage, vegetation, transport and settlement from topographical maps (Plateau and Plain); Nearest Neighbour Analysis of settlement distribution; Application of fluvial morphometric techniques on drainage basins demarcated on the topographical map – Linear, Aerial and Relief aspects; Slope Analysis **ANALYSIS OF GEOLOGICAL MAPS AND DAILY WEATHER MAPS:** Construction of geological section of horizontal, uniclinal, folded and faulted, structures along with igneous intrusions and line of unconformity; Succession and relation with rock groups; Topography and its relation with underlying structures; Interpretation of geological history; Interpretation of Daily Weather Maps prepared by Indian Meteorological Department **CARTOGRAMS, SURVEY AND THEMATIC MAPPING:** Concept and types of scale and map; Concepts of cartograms and thematic maps; Isopleth and Choropleth maps; Landuse and Landcover maps; Climograph, Hythergraph and Ergograph; Age-Sex Pyramid; Basic concepts of surveying and levelling; Concepts of bearing: magnetic and true, whole-circle and reduced; Land survey instruments and their uses; Survey Equipment: Abney's Level, Clinometer, Prismatic Compass, Dumpy Level, Transit Theodolite; GPS, GNSS; Total Station; Survey Schedule and questionnaires for perception survey

	ADVANCED CARTOGRAPHY AND GEOINFORMATICS: Basic principles of cartography; Map projections; Geoid, Spheroid and Ellipsoid; Principles of Spherical Trigonometry; Principles and properties of UTM Projections; Digital Elevation Model (DEM); Concept of Geoinformatics; Remote Sensing Platforms and Sensors; Nature of EMR, EMS and interaction with atmosphere and surface materials; Resolution of satellite data: types and significance; Digital Image Processing – Principles and approaches; Analytical Modelling in GIS, GNSS-GIS integration; Basic principles of photogrammetry; Types and geometry of aerial photographs; Determination of scale of aerial photographs; Delineation of overlapping area and effective area; Elements of aerial photo interpretation; Preparation and interpretation of land use/land cover map from sterio-pairs; Pre-processing of Satellite Images – Radiometric correction; Geometric correction; Subsetting, Layer stacking and mosaicking; Concept of FCC and image classification; Normalised difference spectral indices – NDVI, NDWI, MNDWI, NDPI, NDBI; Concept of geo-referencing and digitizing of a map; Google Earth, Google Map; WebGIS, VGI, OSM; Remote Sensing and GIS software