SYLLABI FOR
RESEARCH ENTRANCE TEST (RET)

The entrance examination paper shall consists of 100 objective type questions. The candidate shall be required to attempt all the questions. Duration of the examination shall be of 2 hrs. There shall be no negative marking. There shall be two sections (Sec.A and Sec. B) in the question paper. Section-A shall be common to all subjects and section-B shall be subject specific. The syllabus for entrance exam for each subject is as follows:

SECTION A- 50 (Common to all)

SECTION B- 50 (Subject Specific)

SECTION A

Research Methodology & Research Aptitude

Note: Section-A shall be divided into five units. There shall be about ten questions from each unit. Altogether there shall be fifty compulsory questions of one mark each.

Unit – I

Meaning of Research: Aims, nature and scope of research, Prerequisites of research, Research Problem, Meaning of research problem, Sources of research problem, Characteristics of a good research problem. Hypothesis: Meaning and types of hypothesis. Research proposal or synopsis.

Types and Methods of Research: Classification of Research, Pure and Applied Research, Exploring or Formulative Research, Descriptive Research, Diagnostic research/Study, Evaluation Research/Studies, Action Research, Experimental Research , Historical Research, Surveys, Case Study, Field Studies.

Unit – II

Review of Related Literature: Purpose of the review, Identification of the related literature, Organizing the related literature. Data Collection : Sampling and Population Techniques of sampling, Selection Characteristics of a good sample, Types of data. Tools of Data Collection: Observation, Interview, Questionnaire, Rating scales, Attitude scales, Schedules, Characteristics of good research tools.

Research Report: Format of the research report Style of writing the report References and Bibliography.

Unit – III

Reasoning: Number Series; Letter Series; Codes, Relationships; Classification. Understanding the Structure of Argument, Evaluating and distinguishing Deductive and Inductive Reasoning, Verbal Analogies; Word Analogy-Applied Analogy, Verbal Classification, Reasoning Logical Diagrams; Simple Diagrammatic Relationship, Multi- Diagrammatic Relationship, Venn Diagram; Analytical Reasoning.

Unit – IV

Data Interpretation and ICT: Sources, Acquisition and Interpretation of Data, Quantitative and Qualitative Data, Graphical Representation and Mapping of Data.

Information and Communication Technology (ICT): Meaning, Advantages, Disadvantages and Uses, General Abbreviation and Terminology, Basics of Internet and E– mailing.

Computer assisted research using internet as research tool, object and method.

Plagiarism, Study of legal research programmes such as Lexis etc.

Unit – V

Higher Education System- Governance, Policy and Administration: Structure of the Institutions for Higher Learning and Research in India; Formal and Distance Education; Professional / Technical and General Education; Value Education; Governance, Policy and Administration; Concept, Institutions and their Interactions.

SYLLABI FOR
RESEARCH ENTRANCE TEST (RET)
SECTION-B

संस्कृत

(Code No. GKV - 101)

Note :

(i) Paper setter shall set 50 questions from the syllabus and each question shall carry one mark.

(ii) Normally ten questions should be set from each unit of the prescribed syllabus for RET.

प्रथम घटक- वैदिक साहित्य १० अङ्क

(क) ऋग्वेद के निम्न सूक्त ख्र अग्नि 1.1, विष्णु 1.54, इन्द्र 2.12, पुरुष 10.129, नासदीय 10. 12

(ख) यजुर्वेद- 40 वाँ अध्याय

(ग) अथर्ववेद- पृथिवी सूक्त 1-20 मन्त्र

(घ) निरुक्त- प्रथम द्वितीय अध्याय

(ङ) वैदिक साहित्य का इतिहास ख्र वेदोत्पत्ति, वेदों के प्रतिपाद्य विषय, वेदों के प्रमुख भाष्यकार, वेदाङ्गों एवं उपनिषदों का संक्षिप्त परिचय

द्वितीय घटक- व्याकरण एवं भाषाविज्ञान १० अङ्क

(क) कारकीय: (महर्षि दयानन्द)

(ख) लघुसिद्धान्तकौमुदी के अग्रलिखित प्रकरण- सन्धि, समास, कृदन्त

(ग) व्याकरण महाभाष्यम् (प्रथम आह्निक)

(घ) व्याकरणशास्त्र के इतिहास का सामान्य परिचय

(ङ) भाषाविज्ञान- भाषा विज्ञान का स्वरूप, भाषा का प्रादुर्भाव एवं विकास, भाषाओं का वर्गीकरण- आकृतिमूलक, वंशमूलक, अर्थपरिवर्तन के नियम, भाषापरिवर्तन के कारण

तृतीय घटक- दर्शनशास्त्र १० अङ्क

(क) सांख्यकारिका

(ख) तर्कभाषा का प्रमाण विवेचन

(ग) वेदान्तसार

(घ) भारतीय आस्तिक नास्तिक दर्शनों का सामान्य परिचय

चतुर्थ घटक- संस्कृतकाव्य, नाटक एवं काव्यशास्त्र १० अङ्क

(क) नैषधीय चरितम् (प्रथम सर्ग) मेघदूतम् (पूर्वमेघ)
उत्तररामचरितम् (प्रथम चार अङ्क)
मुद्राराक्षसनाटकम् (प्रथम पाँच अङ्क)
रत्नावली नाटिका
कादम्बरी (कथामुख पर्यन्त)

(ख) संस्कृतसाहित्य का सामान्य परिचय

(ग) काव्यप्रकाश 1, 2, 8, 9, 10 उल्लास, ध्वन्यालोक प्रथम उद्द्योत, दशरूपक

(घ) काव्यशास्त्र के इतिहास का सामान्य परिचय

पञ्चम घटक- संस्कृत अनुवाद १० अङ्क

इस घटक में संस्कृत अनुवाद से सम्बद्ध शुद्धि अशुद्धि विषयक दश प्रश्न पूछे जायेंगे।

वैदिक साहित्य

(Code No. GKV-102)

Note :

(i) Paper setter shall set 50 questions from the syllabus and each question shall carry one mark.

(ii) Normally ten questions should be set from each unit of the prescribed syllabus for RET.

ईकाई-1 ऋग्वेद

निम्न सूक्तों का अध्ययन - 1/1(अग्नि) 2/12 (इन्द्र) 7/76 (उषा) 10/18 (मृत्यु) 10/34 (द्यूत) 10/57 (सोम) 10/58 (मन आवर्तन) 10/121 (हिरण्यगर्भ) 10/151 (श्रद्धा) 10/190 (अघमर्षण) 10/191 (संवनन)। यजुर्वेद (वाजसनेयी माध्यन्दिन)

(क) निम्न अध्यायों का अध्ययन-

(i) 31,32,36 एवं 40 (सम्पूर्ण)

(ii) 34/01/ से 06 मंत्र, 34 से 40 मंत्र
20/84 से 86 मंत्र, 13/27 से 29 मंत्र

(ख) ऋग्वेदादिभाष्य भूमिका (स्वामी दयानन्द) के निम्न विषयों का अध्ययन-

(i) वर्णाश्रम व्यवस्था (ii) पचमहायज्ञ विषय (iii) वेदोत्पत्ति

ईकाई-2 सामवेद

सामवेद संहिता के निम्न मन्त्रों का आध्यात्मिक अध्ययन

(क) (i) आग्नेयपर्व के प्रारम्भिक 10 मन्त्र

(ii) ऐन्द्र पर्व के प्रारम्भिक 10 मन्त्र

(iii) पावमान पर्व के प्रारम्भिक 10 मन्त्र

(ख) सामगानों का संक्षिप्त परिचय।

अथर्ववेद

(क) अथर्ववेद (शौनक) के निम्न सूक्तों का अध्ययन-
1/34 (मधुविद्या), 3/30 (सांमनस्य), 11/5 (ब्रह्मचर्य), 12/1/1 से 18 (भूमि), 19/53 (काल)।

(ख) ऋग्वेदादिभाष्य भूमिका के निम्न प्रकरणों का अध्ययन-
(1) वेद संज्ञा (2) उपासना (3) पुनर्जन्म

(ग) निम्नलिखित प्रमुख वैदिक विषयों का अध्ययन-

(i) वेदो का मुख्य विषय अध्यात्म ज्ञान

(ii) वेदों में गौण विषय भौतिक विज्ञान

(iii) वैदिक यथार्थवाद

(iv) वैदिक एकेश्वरवाद

ईकाई-3 निम्न का अध्ययन-

(क) निरुक्त प्रथम और द्वितीय अध्याय

(ख) वर्णोच्चारण शिक्षा (स्वामी दयानन्द)

(ग) ऋग्वेदादिभाष्यभूमिका (स्वामी दयानन्द) का वैदिक व्याकरण प्रकरण।

(घ) वैदिक छन्दों का परिचय

कर्मकाण्ड

स्वामी दयानन्द प्रणीत संस्कार विधि (सम्पूर्ण)

ईकाई-4 वैदिक साहित्य का इतिहास

वेद, ब्राह्मण, आरण्यक, उपनिषद् एवं वेदांग साहित्य का सामान्य परिचय।

उपनिषद् वाङ्मय

निम्न उपनिषदों का अध्ययन-

1. श्वेताश्वतरोपनिषद् (सम्पूर्ण)।
2. केनोपनिषद् (सम्पूर्ण)।
3. कठोपनिषद् (सम्पूर्ण)।

ईकाई-5 भारतीय दर्शन

निम्न ग्रन्थों का अध्ययन

1. सांख्यकारिका-आचार्य ईश्वरकृष्ण (सम्पूर्ण)।
2. श्रीमद्भगवद्गीता का द्वितीय अध्याय।
3. अष्टांगयोग का सामान्य परिचय।
4. षड्दर्शनों का सामान्य परिचय।

लौकिक संस्कृत

(क) संस्कृत साहित्य का सामान्य परिचय-वाल्मीकि, व्यास, कालिदास, भवभूति, बाणभट्ट, मम्मट।

(ख) काव्यप्रकाश-आचार्य मम्मट-प्रथमोल्लास सम्पूर्ण।

(ग) हिन्दी से संस्कृत एवं संस्कृत से हिन्दी में अनुवाद।

PHILOSOPHY

(Code No. GKV-103)

Note :

(i) Paper setter shall set 50 questions from the syllabus and each question shall carry one mark.

(ii) Normally ten questions should be set from each unit of the prescribed syllabus for RET.

इकाई – 1

अवैदिक दर्शन

चार्वाक– भौतिकवाद, प्रत्यक्ष सिद्धान्त, अनुमान का खण्डन, चार पदार्थ।

जैन – स्याद्वाद, सप्तभंगीनय, अनेकान्तवाद, द्रव्य : अस्तिकाय, अनस्तिकाय, जीव–अजीव, त्रिरत्न।

बौद्ध– प्रत्यक्ष, अनुमान, प्रमाण–व्यवस्था, प्रतीत्यसमुत्पाद, अनात्मवाद, क्षणिकवाद, शून्यवाद, त्रिरत्न (शील, समाधि, प्रज्ञा), निर्वाण।

न्याय–वैशेषिक दर्शन

ज्ञान, ज्ञान के स्रोत, परतः प्रामाण्य, वस्तुवाद, प्रमाण–सम्प्लव, कार्य–कारण सिद्धान्त, ईश्वर के अस्तित्व में प्रमाण, न्याय–पदार्थ, वैशेषिक पदार्थ, परमाणु–सिद्धान्त, बन्धन, मोक्ष।

NON-VAIDIC PHILOSOPHY

Charvak – Materialism, Theory of Perception, Refutation of Inference, Four Categories.

Jain – Theory of Syâdvâda, Saptabhangi Naya, Anekântavâda, Substance : Astikâya, Anastikâya, Jiva–Ajiva, Tri-Ratna.

Buddhist – Perception, Inference, Pramânò-vyavastha, Dependent origination, No-soul-Theory, Momentariness, Shûnòyvâd, Tri-Ratna (Sheel, Samâdhi, Prajnya), Nirvân.

NYAYA–VAISHESHIKA

Knowledge, Sources of Knowledge, Parateh–Prâmânya, Realism, Pramânò-samplava, Theory of Causation, Proofs for the existence of God, Nyâya's Categories, Vaisheshika's Categories, Theory of Atoms, Bondage, Liberation.

इकाई – 2

सांख्य–योग

पुरूष एवं प्रकृति, उनके अस्तित्व के प्रमाण, गुणत्रय, पुरूष प्रकृति सम्बन्ध, सृष्टिक्रम, पुरूष–बहुत्व, सत्कार्यवाद, ज्ञान का स्वतः प्रामाण्य;

योग की परिभाषा, योग की विषय वस्तु, चित्त, चित्त की वृत्तियॉ एवं भूमियाँ, योग के आठ अंग, ईश्वर।

पूर्व मीमांसा–वेदान्त

शब्द, शब्द बोध, शब्द–प्रकृति, शब्द शक्तियाँ (अभिधा, लक्षणा, व्यंजना), संकेतग्रह (व्यक्तिवाद, जातिवाद, आकृति, व्यक्ति–जाति–आकृतिवाद), स्फोट–सिद्धान्त।

आत्मा, ज्ञान का स्वभाव, धर्म तथा धर्म–लक्षण, भावना। ब्रह्म, ईश्वर, जीव, जगत्, माया, अविद्या, अध्यास, विवर्तवाद, ज्ञान, कर्म, उपासना, अद्वैत, विशिष्टाद्वैत, शरणागति।

Unit – II

SANKHYA–YOGA

Purusha and Prakriti, Proofs for their existence, Three–Gunòas, relation of Purushaha and Prakriti, Evolution of the world, Plurality of the Purusha, Satkâryavâda. Svatah-prâmânya.of knowledge.

Definition of Yoga, The subject Matter of Yoga: Chitta, it's stages and vritties, Eight limbs of Yoga, God.

PURVA MIMANSA-VEDANTA

Shabda, Shabdabodha, Nature of Shabda, Shabda-Shakti (Abhidha, Lakshana, Vyanjana,), Referent of a word (Vyaktivâda, Jâtivâda, Âkritivâda, Vyakri-jâti-âkritivâda), The Theory of Sphota.

The soul, The nature of knowledge, Dharma and it's Characteristics, Bhâvanâ, Brahma, Ishwar, Jiva, Jagat, Mâyâ, Avidya, Adhyâsa, Vivartavâda, Jñâna, karma, upâsanâ, Advaita, Vishishtadvaita, Sharnâgati.

इकाई – 3

तर्कशास्त्र

तर्कशास्त्र की परिभाषा, तर्कशास्त्र का क्षेत्र, आगमन, निगमन, सत्य एवं वैधता, तार्किक प्रतीक, सत्य–सारणियाँ, विचार के नियम– तादात्म्य का नियम, व्याघात नियम एवं मध्य परिहार का नियम। न्याय वाक्य, पंचावयव, हेतु, हेत्वाभास, व्याप्ति, कान्ट्रेरी तथा सब–कान्ट्रेरी प्रतिज्ञप्तियाँ।

भारतीय एवं पाश्चात्य नीतिशास्त्र

भारतीय नीतिशास्त्र का स्वभाव तथा क्षेत्र, शुभ–अशुभ, पुरूषार्थ–चतुष्टय, वर्णाश्रम धर्म, स्थितिप्रज्ञता, प्रवृत्ति एवं निवृत्ति मार्ग, गीता में ज्ञानयोग, भक्तियोग,एवं कर्मयोग; चार आर्य सत्य, त्रि–रत्न।

पाश्चात्य नीतिशास्त्र का स्वभाव,एवं क्षेत्र, नैतिक–निर्णय, सुखवाद, उपयोगितावाद, शुभ और अशुभ की परिभाषा, प्राकृतिक हेत्वाभास, संकल्प की स्वतंत्रता, दण्ड के सिद्धान्त, नैतिकता, उचित–अनुचित,कैटेगरीकल इम्परेटिव ,काण्ट का नैतिक सिद्वान्त।

Unit- III

LOGIC

Definition of Logic, Scope of Logic, Induction, Deduction, Truth and Validity, Logical Symbols, Truth– Tables, Laws of Thought – Law of Identity, Law of Contradiction and Law of excluded middle. Syllogism, Panchavayava, Hatu, Hetvâbhâsa (Fallacies of inference) Vyâpti, Contrary and sub-contrary propositions.

INDIAN AND WESTERN ETHICS

Nature and scope of indian Ethics, Shubha-Ashubha, Purusârtha-Chatushtaya,Varnòashramdharmas, Sthitaprajñata, The ways of Pravitti and Nivritti, Jñâna, Bhakti Yoga and Karma yoga in Gita, Four noble truths, Tri-Ratna. Nature and Scope of Western Ethics, Moral Judgment, Hedonism, Utalitarianism, definition of Good and Evil, Naturalistic Fallacy, Freedom of will, Theories of Punishment, Morality, Right & Wrong, calegorical Imporerative, Moral Theories of Kant.

इकाई – 4

यूनानी एवं आधुनिक पाश्चात्य दर्शन

सुकरात एवं उनकी पद्धति, प्लेटो तथा उनका ज्ञान–सिद्धान्त, अरस्तु एवं उनका तत्त्व–सिद्धान्त, आगस्टाइन का ज्ञान–सिद्धान्त।

बुद्धिवाद	: देकार्त्त, स्पिनोजा, लाइबनित्स;
अनुभववाद	: लॉक, बर्कले, ह्यूम;
समीक्षावाद	: काण्ट।
द्वन्द्ववाद	: हीगेल–निरपेक्ष प्रत्यवाद

समकालीन पाश्चात्य दर्शन

हुसरल का आभास (फिनामिनोलोजिकल) सिद्धान्त : अनुभवातीत आत्मा, अस्तित्ववाद : क्रिकेगार्ड, हाईडेगर, सार्त्र जास्पर्स। ब्रैडले का आभास एवं सत् : सत्य के सिद्धान्त संसक्ततावाद, संवादितावाद अर्थक्रियावाद : विलियम जेम्स, , तार्किक भाववाद विट्गिन्स्टाईन–भाषायी खेल।

Unit – IV

GREEK & MODERN WESTERN PHILOSOPHY

(fundamental problems)

Socrates and his method Plato and his theory of knowledge, Aristotle and his,metaphysics, Augustine's theory of knowledge.

Rationalism	:	Descartes, Spinoza, Leibnitz.
Empiricism	:	Locke, Berkeley, Hume.
Critical Philosophy	:	Immanuel Kant.
Dialecticism	:	Hegel –Absolutism

CONTEMPORRY WESTERN PHILOSOPY

Husserl's Phenomenological Method, Transcendental Soul, Existentialism : Kiekegaard, Heidegger, Sartre, Jasspers, Bradley's, Appearance and Reality, Theories of truth-Correspondance theory, coherence Theory Pragmatism : William James, , Logical Positivism; Language-game of Wittgenstein.

इकाई – 5

समकालीन भारतीय दर्शन

स्वामी दयानन्द–दर्शन : वैदिक–दर्शन, ज्ञानमीमांसा, ईश्वर, जीव, एवं प्रकृति, मायावाद का खण्डन, श्री अरविन्द का अतिमानस विचार, परमतत्त्व एवं दिव्य आत्मा। स्वामी विवेकानन्द का व्यावहारिक वेदान्त, रवीन्द्रनाथ टैगोर का ईश्वर एवं धार्मिक अनुभूति, महात्मा गांधी – सत्य, अहिंसा, सत्याग्रह, साध्य–साधन–सिद्धान्त, रामराज्य।

सामाजिक एवं राजनैतिक दर्शनः व्यक्ति, परिवार, समाज, राज्य, राष्ट्र, अधिकार एवं कर्त्तव्य, स्वतन्त्रता, समानता, न्याय, लोकतंत्र, निरंकुशता, साम्यवाद, वैश्वीकरण, वैदिक समाजवाद, मृत्यु–दण्ड, मृत्यु का अधिकार, लिंग–असमानता।

Unit-V

CONTEMPORARY INDIAN PHILOSOPHY

Philosophy of Swami Dayananda : Vaidik Philosophy, Epistemology, Ishwar, Jiva and Prakriti, Refutation of Mâyâvada. Aurobindo's concept of Atimânasa, Superme Reality and Divine Soul.The practical Vedânta of swami Vivekananda, The Concept of Ishwar and Religious Experience of Rabindranath Tagore Mahatma Gandhi's Theory of Truth, Áhinsâ, Satyâgraha End and Means, theory Râmarâjya,

SOCIAL & POLITICAL PHILOSOPHY

Individual, Family, Society, State, Nation, Rights and Duties, Freedom, Equality, Justice, Democracy, Dictatorship, Communism, Globalization, Vaidic Socialism, Punishment of Death, Right to die, Feticide.

ENGLISH

(Code No. GKV-104)

Note :

(i) Paper setter shall set 50 questions from the syllabus and each question shall carry one mark.

(ii) Normally ten questions should be set from each unit of the prescribed syllabus for RET.

Unit –I

A: Modern Critical theories – main features and major exponents/works

(i) New Criticism
(ii) Structuralism
(iii) Deconstruction
(iv) Feminism
(v) Postcolonialism

B : Indian Critical theories – main features and major exponents/works

(i) Rasa Theory
(ii) Alankar Theory
(iii) Riti Theory
(iv) Dhvani Theory
(v) Vakrokti Theory

Unit – II

A: British Drama- dramatic movements; major dramatists and their works

(i) Elizabethan Drama
(ii) Jacobean Drama
(iii) Restoration Drama
(iv) 20th Century Drama

B: British Poetry – poetic movements; major poets and their works

(i) Chaucer
(ii) 17th Century Poetry
(iii) 18th Century poetry
(iv) 19th Century Poetry
(v) 20th Century Poetry

Unit – III

A : British Novel – growth of English novel; major novelists and their works

(i) Four Wheels of English Novel
(ii) Early 19th Century women novelists
(iii) Victorian novelists
(iv) British novel till World War II
(v) British novelists of post-1950s

B: English Prose – English prose from the 17th to 20th centuries; major writers

(i) Bacon
(ii) Addison and Steele
(iii) Charles Lamb
(iv) Hazlitt, Carlyle and Ruskin
(v) Chesterton, A. G. Gardiner and Robert Lynd

Unit – IV

A: Indian English Poetry – major poets, their works and poetic style

(i) Toru Dutt, Rabindranath Tagore, Sri Aurobindo and Sarojini Naidu
(ii) Nissim Ezekiel, A. K. Ramanujan, Kamala Das and Parthsarthy

B: Indian English novel, its growth, major novelists and their works

(i) Mulk Raj Anand, Raja Rao, R. K. Narayan, Bhabani Bhattacharya and Manohar Malgonkar
(ii) Women novelists since Independence
(iii) Arun Joshi, Amitav Ghosh and Upamanyu Chatterjee

Unit – V

A: Diasporic Writers of Indian origin

(i) V. S. Naipaul, Salman Rushdie, Bharati Mukherjee, Vikram Seth, Rohinton Mistri

B: Postcolonial Novelists

(i) Chinua Achebe, Wole Soyinka, Nadine Gordimer and Ben Okri

हिन्दी साहित्य

(Code No. GKV - 105)

Note :

(i) Paper setter shall set 50 questions from syllabus and each question shall carry one mark.
(ii) Normally ten questions should be set from each unit of the prescribed syllabus for RET.

इकाई–1 हिन्दी साहित्य का इतिहासः आदिकाल, भक्तिकाल

हिन्दी साहित्येतिहास लेखन की परम्परा, हिन्दी साहित्य के इतिहास में काल विभाजन एवं नामकरण, सिद्ध साहित्य, नाथ साहित्य, जैन काव्य, रासो काव्य परम्परा और प्रवृत्तियां, लौकिक साहित्य। संत काव्य परम्परा, सूफी काव्य, परम्परा, कृष्ण काव्य, परम्परा, राम काव्य परम्परा, सम्प्रदाय निरपेक्ष कृष्ण भक्ति काव्य, मीरा, रसखान।

इकाई–2 हिन्दी साहित्य का इतिहासः रीतिकाल, आधुनिक काल

नामकरण, रीतिकाव्य के मूल स्रोत, रीतिबद्ध काव्य, रीतिसिद्ध काव्य, रीतिमुक्त काव्य, रीति कवियों का आचार्यत्व, रीतिकालीन भक्ति, वीर एवं नीति काव्य. भारतेन्दु पूर्व हिन्दी गद्य, भारतेन्दु युग, द्विवेदी युग,छायावाद, राष्ट्रीय–सांस्कृतिक काव्य धारा, प्रगतिवाद, प्रयोगवाद, नई कविता, आधुनिक कविता,हिन्दी गद्य विधाओं का विकासात्मक अध्ययन. उपन्यास, कहानी,नाटक निबंध, समीक्षा, एकांकी, जीवनी, आत्मकथा, संस्मरण–रेखाचित्र, यात्रावृन्त।

इकाई–3 भाषा विज्ञान एवं हिन्दी भाषा

भाषाः परिभाषा एवं अभिलक्षण, भाषिक संरचना, स्वन एवं स्वनिम विज्ञान (फोनेटिक्स एवं फोनोलॉजी), रूप विज्ञान, वाक्य विज्ञान, अर्थ विज्ञान, देवनागरी लिपि. हिन्दी भाषा का उद्भव एवं विकास हिन्दी का क्षेत्र विस्तार, हिन्दी की उप भाषाएँ, पूर्वी एवं पश्चिमी हिन्दी की बोलियाँ. हिन्दी का भाषिक स्वरूप, स्वनिम व्यवस्था, शब्द रचना, रूप रचना, वाक्य रचना, हिन्दी शब्द भण्डार, राजभाषा के रूप में हिन्दी।

इकाई–4 काव्य शास्त्र : भारतीय एवं पाश्चात्य

काव्य लक्षण, काव्य हेतु, काव्य प्रयोजन, शब्द शक्ति, काव्य के प्रकार, रस सम्प्रदाय , अलंकार सम्प्रदाय , रीति सम्प्रदाय, वक्रोक्ति सम्प्रदाय, ध्वनि सिद्धांत, औचित्य सम्प्रदाय, हिन्दी कवि–आचार्यो का काव्य शास्त्रीय चिंतन. प्लेटो, अरस्तू, लोंजाइनस, वड्र्सवर्थ, कालरिज, मैथ्यू ओर्नल्ड, टी.एस. इलियट तथा आई.ए. रिचड्र्स की काव्य विषयक मान्यताएँ. पाश्चात्य समीक्षा के प्रमुखवाद, आधुनिक समीक्षा की विशिष्ट प्रवृत्तियां।

इकाई–5 हिन्दी पत्रकारिता एवं प्रयोजनमूलक हिन्दी

हिन्दी पत्रकारिता का उद्भव एवं विकास, सम्पादन कला, पत्रकारिता सम्बन्धी लेखन, प्रिंट मीडिया, इलेक्ट्रानिक मीडिया, पत्रकारिता प्रबंधन, विज्ञापन कला, सूचना प्रौद्योगिकी, पत्रकारिता सम्बन्धी कानून एवं आचार संहिता, सूचना का अधिकार, कार्यालयी हिन्दी के प्रमुख कार्य– प्रारूपण, पत्र लेखन, संक्षेपण, पल्लवन, टिप्पण, ज्ञान विज्ञान के विभिन्न क्षेत्रों की पारिभाषिक शब्दावली, कंप्यूटर–परिचय, उपयोग तथा क्षेत्र, इन्टरनेट, वेबसाइट, अनुवाद :स्वरूप–क्षेत्र ज्ञान विज्ञान के विविध क्षेत्रों की पारिभाषिक शब्दावली, विविध क्षेत्रों के महत्वपूर्ण शब्दों के अनुवाद– अंग्रेजी से हिन्दी।

YOGIC SCIENCE
(Code No. GKV-106)

Note :

(i) Paper setter shall set 100 questions from the syllabus and each question shall carry one mark.

(ii) Normally ten questions should be set from each unit of the prescribed syllabus for RET.

इकाई–1 योग का इतिहास एवं विकास

योग का उद्भव, योग का इतिहास और विकास, योग की विभिन्न परम्पराएँ, योग का अर्थ और परिभाषाएँ, योग की भ्रांतियाँ योग का लक्ष्य एवं उद्देश्य। योग के विभिन्न संप्रदाय एवं साधना का परिचयः वेदान्त परम्परा के अनुसार योग (ज्ञान, भक्ति, कर्म और ध्यान), सांख्य के अनुसार योग की परम्परा (पातञ्जलयोग) और तंत्र परम्परा के अनुसार योग की साधना (हठयोग, स्वरयोग और मन्त्रयोग)।

वेदों के अनुसार योग का स्वरूप, उपनिषदों का सामान्य परिचय, अर्थ, परिभाषा, प्रमुख दस उपनिषदों के अनुसार योग की परिभाषा, प्रकार एवं स्वरूप।

सांख्य की तत्वमीमांसा, सृष्टिप्रक्रिया, सत्कार्यवाद, प्रकृति का स्वरूप, पुरुष का स्वरूप, त्रिगुण सिद्धान्त, अन्तःकरण की अवधारणा, बंधन एवं मोक्ष।

श्रीमद्भगवद्गीता का परिचय, श्रीमद्भगवद्गीता के अनुसार योग की परिभाषाएं , योग के प्रकार– सांख्य योग, ज्ञान योग, कर्म योग, भक्तियोग सन्यास योग, ध्यान योग, त्रिगुण सिद्धांत, प्रकृति और पुरुष का स्वरूप, त्रिविध श्रद्धा, यौगिक आहार–विहार।

आधुनिक काल में योगः रामकृष्ण, स्वामी विवेकानन्द और श्री अरविन्द की योग परम्पराएं, महर्षि रमण व स्वामी दयानन्द सरस्वती की योग परम्पराएं।

मानव चेतना : चेतना का अर्थ, परिभाषा एवं अवधारणा, मानव चेतना के अध्ययन की आवश्यकता। वेद, उपनिषद। ज्योतिष, आयुर्वेद, दर्शन, तंत्रशास्त्र में चेतना की अवधारणा। चेतना के विभिन्न रहस्य –कर्म संस्कार एवं पुनर्जन्म, भाग्य एवं पुरूषार्थ, मानव चेतना में विकास की विभिन्न विधियाँ।

UNIT - I Historyand Development of Yoga

Origin of Yoga, History and Development of Yoga; different traditions of Yoga, Meaning and Definitions, Misconceptions, Aim and Objectives of Yoga, Introduction to Schools (Streams) of Yoga: Yoga Schools with Vedanta Tradition (Jnana, Bhakti,Karma and Dhyana), Yoga Schools with Samkhya-Yoga Tradition (Yoga of Patanjali) and Yoga Schools with Tantra Tradition (Hatha Yoga, Swara Yoga and Mantra Yoga).

Nature of Yoga according to Veda, Brief Introduction to Upanishads, Meaning and definitions of Upanishad, Definition, types and nature of Yoga in principle Upanishads.

Metaphysics of Samkhya, theory of evolution, Satkaryabad, nature of Prakrati and Purush, principle of Triguna, concept of Antahkaran, Bandhan and Moksha.

Introduction to Shrimadbhagvatgeeta, different definitions of Yoga according to Shrimadhagvatgeeta, types of Yoga: Samkhya Yoga, Jyan Yoga, Karma Yoga, Bhakti Yoga, Samnyas Yoga, Dhyan Yoga, Principle of Triguna, Nature of Prakriti and Purush, Trividh Shraddha, Yogic Ahar-Vihar.

Yoga in Modern Times: Yogic Traditions of Ramakrishna and Swami Vivekananda, Shri Aurobindo; Yoga traditions of MaharshiRamana and Swami Dayanand Saraswati.

Human Consciousness: Meaning, definition and concept, need of study of Human consciousness, concept of Consciousness in Vedas, Upnishads, Philosophy,Tantra, Astrology and Ayurveda. different mysteries of Consciousness - Bhagya and Purusarth.

Sanskar& rebirth. Various methods of development of Human consciousness.

इकाई–2 पातंजल योगसूत्र एवं हठयोग

पातंजल योगसूत्र का सामान्य परिचय, योग का अर्थ एवं परिभाषा, चित्त की अवधारणा, चित्तभूमियाँ, चित्त वृत्तियाँ, अभ्यास और वैराग्य के द्वारा चित्त वृत्ति निरोध के उपाय, चित्त–विक्षेप (योग अन्तराय) चित्त–प्रसादन, समाधि के प्रकार, सम्प्रज्ञात, ऋतंभरा प्रज्ञा, धर्ममेघ समाधि, असम्प्रज्ञात समाधि, समापत्ति और समाधि के मध्य अन्तर, ईश्वर का स्वरूप, क्रिया योग, पंच क्लेश, दृष्टा एवं दृश्य (प्रकृति एवं पुरूष) का स्वरूप, चतुरव्यूह वाद, अष्टांग योग का परिचय, संयम और सिद्धियों का परिचय, कर्म के प्रकार, विवेक ख्याति, कैवल्य का स्वरूप।

हठयोग : हठयोग का सामान्य परिचय, अर्थ एवं परिभाषा, हठयोग के उद्देश्य, मठ की अवधारणा, मिताहार, हठयोग के साधकों द्वारा पालन किए जाने वाले नियम, हठयोग साधना – षट्कर्म, आसन, प्राणायाम, मुद्रा, प्रत्याहार, धरणा, ध्यान समाधि। हठयोग के साधक और बाधक तत्त्व, नाद और नादानुसंधान की अवधरणा, हठयोग और राजयोग के मध्य अन्तःसम्बन्ध, हठयोग की समसामयिक उपादेयता।

UNIT - II PATANJALAYOGASUTRA AND HATHYOGA:

PATANJALAYOGASUTRA

General Introduction ofPatanjalayogasutra,Meaning and definition of Yoga, Concept of Chitta, Chitta-Bhumis, Chitta-Vrittis, Chitta-VrittinirodhopayathroughAbhyasa and Vairagya, Chitta-Vikshepas (Antarayas), Chitta-prasadana, Types of Samadhi; Samprjyat, Ritambharaprajna, dharmegh Samadhi, Asamprajyata, Difference between Samapattis and Samadhi; Nature of Ishvara, PanchKleshes,Nature of DrishayevamDrashta (Prakruti and Purush), Chaturvyuhvad, introduction of Ashtangyoga,introduction to Samyama and its Siddhis, types of Karmas, VivekKhyati, Nature of Kaivalya.

Hathyoga

General introduction of Hathyoga, meaning and definition, objectives of Hathyoga, concept of Matha, Mitahar, Rules & Regulations to be followed by Hatha Yoga Sadhakas, Hathyogasadhna: shatkarma, asan, pranayama, Mudra, Pratyahar, dhyan, Samadhi, Sadhaka and Badhakatattvas in Hatha Yoga, concept of Nada and Nadanusandhan, Inter-Relationship between Hatha Yoga and Raja Yoga, Relevance of Hatha Yoga in contemporary times.

इकाई–3 मानव शरीर रचना एवं क्रिया विज्ञान का परिचय

कोशिका एवं ऊतक का परिचय, शरीर की परिभाषा, जैवविद्युत क्षमता पेशीकंकाल तंत्र–कंकाल–अस्थियों के नाम, संधियां एवं मांसपेशीयां उपास्थि, टेण्डन एवं लिगामेन्ट्स, अस्थियों एवं संधियों के प्रकार एवं कार्य, मेरूदण्ड, मांसपेशियां एवं उसके कार्य, कंकाल पेशियां–कंकाल पेशी के गुण एवं उसके कार्य।

पाचन एवं उत्सर्जन तंत्र–पाचन तंत्र की संरचना, उत्सर्जन तंत्र के अंग, एवं उनके कार्य। पाचन संस्थान–आहार नाल की सामान्य रचना, आमाशयिक स्त्राव, अग्नाशिक स्त्राव, आमाशयी गतिशीलता सम्बन्धी–पेरिसटेलसिस आमाशयिक एवं आंत्रिय हार्मोन्स।

वृक्क/गुर्दा की क्रियाविधि–वृक्क की संरचना, नेफ्रान्स (वृक्काणु), जॅक्सटा ग्लोमेरूलर फिलट्रेट, पुनःअवशोषण, स्त्रावक्रिया विधि, मूत्र का सान्द्रीकरण एवं तनुकरण क्रियाविधि, डायलिसिस।

तंत्रिका–तंत्र एवं ग्रन्थियाँ– न्यूरोन्स की संरचना एवं कार्य, तंत्रिका–तंत्र के विभिन्न उपांग एवं उनके कार्य। अंतःस्त्रावी एवं बाह्य स्त्रावी ग्रंथियाँ, अंतःस्त्रावी एवं बाह्य स्त्रावि ग्रंथियों के महत्व, हार्मोन्स के प्रकार एवं कार्य, संवेदी तंत्रिका–तंत्र, प्रेरक तंत्रिका तंत्र, तंत्रिका–तंत्र के उच्चतर कार्य, स्नायु संधि, प्रत्यावर्ती क्रिया, सेरिब्रोस्पाइनल द्रव, रक्त–मस्तिष्क एवं रक्त सेरिब्रोस्पाइनलद्रव्य अवरोध।

हृदय रक्त परिवहन तंत्र एवं श्वसनतंत्र–हृदय–रक्त परिवहन तंत्र एवं श्वसन तंत्र के विभिन्न अवयव एवं कार्य। रक्तफ परिवहन तंत्र–हृदय की क्रियात्मक संरचना, हृदयपेशी के विशेष गुण, हृदय की क्रियाविधि का प्रवाह तंत्र, हृदय–चक्र में विभिन्न दबाव परिवर्तन, रक्तफ–कोशिकाओं में परिवहन, धमनी एवं शिरा में रक्तदाब। श्वसनतंत्र–श्वसन की क्रियाविधि, वायु आदान–प्रदान, श्वसन–क्रिया नियंत्रण, गैसों का परिवहन, हाइपोक्सिया, कृत्रिम–श्वसन एवं फेफड़ों के अश्वसनित कार्य।

रोग प्रतिरक्षा–तंत्र–रोग प्रतिरक्षा–तंत्र के विभिन्न अंग–अवयव एवं कार्य, अंतःस्त्रावी तंत्रा–विभिन्न अंतःस्त्रावी ग्रंथियाँ, हार्मोन्स एवं इनके कार्य, प्रजनन तंत्र–स्त्री एवं पुरूष जननांग की संरचना।

UNIT - III ANATOMY AND PHYSIOLOGY, DIET AND NUTRITION

Introduction to cell and tissue, definition of Human body, bioelectric potentials.

Musculoskeletal systems: Skeleton - names of all bones, joints and muscles, cartilage, tendon and ligaments, types of bone, joints and their functions; spine, muscles and their functions; Skeletal muscles - Properties of skeletal muscles, Muscular contraction and relaxation.

Digestive and excretory system: Anatomy of digestive system, excretory system (component organs) and their functions; Gastro intestinal system- General, Structure of alimentary canal, Gastric secretion, Pancreatic secretion.

Renal physiology- Structure of kidney, Nephrones, Juxtra glomerular filtrate, Reabsorption, Secretion-mechanism of secretion, Concentrating and diluting mechanism of urine, Dialysis.

Nervous system and glands: Structure and properties of neurons, subdivisions of nervous system and their functions, types of glands (endocrine and exocrine glands), important endocrine and exocrine glands and types of hormones their functions.

Cardiovascular and respiratory system: Components of cardiovascular and respiratory system; functions of cardiovascular and respiratory system; Circulatory system-Functional anatomy of the heart, Properties of cardiac muscles, Arterial and venous blood pressure; Respiratory system-Mechanism of breathing, Ventilation, Regulation of respiration, Transport of gases.

Immune system: Component organs of immune system, Functions of immune system; Endocrinology-Endocrine glands, hormones, their functions;Reproductive system: Anatomy of male and female reproductive systems.

इकाई–4 योग एवं स्वास्थ्य, आहार एवं पोषण, यौगिक चिकित्सा – व्याधियों के अनुसार एवं प्रमाण पर आधारित

योग एवं स्वास्थ्य

वर्ल्ड हेल्थ आर्गेनाईजेशन के अनुसार स्वास्थ्य की परिभाषा एवं महत्त्व, स्वास्थ्य के आयामः शारीरिक, मानसिक, सामाजिक एवं आध्यात्मिक, भारतीय चिकित्सा पद्धति (आयुर्वेद, वैकल्पिक चिकित्सा) में स्वास्थ्य और व्याधि की अवधरणा, स्वास्थ्य और व्याधि की यौगिक अवधरणा–आधि–व्याधि की अवधारणा, अर्थ एवं परिभाषाऐं, पंचकोश एवं षटचक्र की अवधारणा तथा स्वास्थ्य और चिकित्सा में उनकी भूमिका।

आहार एवं पोषण

आहार एवं पोषणः आहार – आहार एवं पोषण की अवधारणा, परिभाषा, कार्य, घटक, संतुलित आहार, संतुलित आहार।

यौगिक चिकित्सा – व्याधियों के अनुसार एवं प्रमाण पर आधारितः– साइनसाइटिस (शिरानालशोथ), सीओपीडी : दीर्घकालीन श्वासनली शोथ (ब्रोन्काइटिस), अस्थमा, उच्चरक्तचाप, कोरोनरी आर्टरी डिसीसेस/धमनी काठिन्य रोग, मधुमेह डाइबिटिस मालाइटस टाइप I एवं II, हाइपो और हाइपर थाइरोडिजम, मोटापा।

मासिक धर्म प्रारम्भिकता सम्बन्धी विकार, रजोनिवृत्ति और पूर्व रजोनिवृत्ति संलक्षणः गर्भावस्था एवं प्रसव के लिए योगः गेस्टेशनल डीएम।

अजीर्ण, पेप्टिक अल्सर, कब्ज, अतिसार/संग्रहणी, पीठ दर्द, लंबर स्पॉन्डिलाइटिस, स्पान्डिलाइटिस, गर्दन दर्द, सर्वाइकल स्पान्डिलोसिस, आर्थिरिटिस के सभी रूपः रह्यूमेटॉइड आर्थिरिटिस एवं ऑस्टीओआर्थिरिटिस, सिरदर्दः माइग्रेन।

मानसिक/साइकियाट्रिक विकारः स्नायु–तन्त्र आधारित मनोविकृति, मनोविक्षिप्तताः दुष्चिंता रोगः सामान्यीकृत चिंता विकार, पैनिक इन्जाइटी, मनोग्रसित बाध्यकारी विकार, फोबिया (भय): अवसाद, तनाव, सायकोसिस, अनिद्रा, बाइपोलार अफेक्टिव डिसॉर्डर।

क्रियात्मक योगः–यौगिक अभ्यास– षट्कर्म, आसन, सूर्यनमस्कार, प्राणायाम, क्रिया, मुद्रा, बन्ध, ध्यान, (विधियां, विशेषताऐं एवं लाभ)।

UNIT - IV Yoga & Health, Dietetics and Nutrition, Therapeutic Yoga - Disease Wise and Evidence based Yoga & Health

Definition & Importance of Health According to WHO; Dimensions of Health: Physical, Mental, Social and Spiritual, Concept of Health and Disease in Indian Systems of Medicine i.e. Ayurveda, Alternative therapy, Yogic Concept of Health and Disease: Concept of Adhi and Vyadhi; Meaning and definitions, Concept of Pancha-koshas & Shat-chakra and their role in Health and Healing.

Dietetics and Nutrition

Concepts of food and nutrition, definition, component and functions of diet. Concept of balance diet.

Therapeutic Yoga - Disease Wise and Evidence based

Sinusitis, COPD: Chronic Bronchitis, Asthma, Hypertension, Coronary artery disease, Ischemic Heart disease, Angina pectoris / Myocardial Infarction, Diabetes Mellitus (I&II); Hypo and Hyper- Thyroidism, Obesity.

Dysmenorrhea, Oligomenorrhea, Menorrhagia: Premenstrual Syndrome: Menopause and peri-menopausal syndrome: Yoga for Pregnancy and Childbirth.

Gastritis - Acute & Chronic, Dyspepsia, Peptic Ulcers, Constipation, Diarrhoea, Irritable Bowel Syndrome: Definition, Etiopathogenesis, Inflammatory Bowel Disease, Ulcerative colitis.

Back Pain, Lumbar Spondylosis, Intervertebral disc prolapse (IVDP), Spondylolisthesis, Spondylitis, Psychogenic-Lumbago, Neck pain: Cervical Spondylosis, radiculopathy, Functional neck pain, All forms of Arthritis: Rheumatoid Arthritis, Osteoarthritis, Migraine.

Psychiatric disorders: Neurosis, Psychosis: Neurosis: Anxiety disorders: Generalized anxiety disorder, Panic Anxiety, Obsessive CompulsiveDisorder, Phobias: Depression: Dysthymia, Major depression, Psychosis: Bipolar affective disorder.

Practical Yoga: Yogic Practices - Shatkarma, Asana, Surya Namaskar, Pranayam, Mudra, Bandha, Dhyana, (Techniques, Salient Features, Benefits).

इकाई–5 योग की अध्यापन विधियां

शिक्षण एवं अधिगम–अवधारणा, दोनों में सम्बद्धता, शिक्षण के सिद्धांत, शिक्षण के विभिन्न स्तर एवं अवस्थाऐं, निपुण योग–गुरु की गुणवत्ताऐं, अधिगम प्रक्रिया के यौगिक स्तर, विद्यार्थी, शिष्य, मुमुक्षु, अध्यापन विधियों का अर्थ एवं कार्य क्षेत्र तथा इनको प्रभावित करने वाले तत्त्व, अध्यापन विधियों के स्त्रोत, योग अध्यापक की भूमिका एवं अध्यापकीय प्रशिक्षण की भूमिका, व्यक्तिपरक शिक्षण विधियां, समूह में शिक्षण अध्यापन की विधियाँ, सामुहिक निर्देष युक्त विधियाँ, अध्यापन के संघटनात्मक पहलू, (समय–प्रबन्धन, अनुशासन आदि) ।

उत्तम पाठ योजना के आवष्यक तत्व– अवधारणायें, आवश्यकताऐं, योग अध्यापन की योजनाऐं (शोधन क्रियायें, आसन, मुद्रा, प्राणायाम एवं ध्यान) ।

अध्यापक के प्रति विद्यार्थी का दृटिष्कोण–प्रणिपात, परिप्रश्न, सेवा, (भ.गीता 4.3)।

UNIT - V Methods of Teaching in Yoga

Teaching and Learning: Concepts and Relationship between the two; Principles of Teaching: Levels and Phases of Teaching, Quality of perfect Yoga Guru; Yogic levels of learning, Vidyarthi, Shishya, Mumukshu; Meaning and scope of Teaching methods, and factors influencing them; Sources of Teaching methods; Role of Yoga Teachers and Teacher training Techniques of Individualized; Teaching Techniques of group teaching; Techniques of mass instructions; Organization of teaching (Time Management, Discipline etc).

Essentials of Good Lesson Plan: concepts, needs, planning of teaching Yoga (Shodhanakriya, Asana, Mudra, Pranayama & Meditation);

Student's Approach to the teacher: Pranipaata; Pariprashna; Seva; (BG 4.34).

ANCIENT INDIAN HISTORY, CULTURE AND ARCHAEOLOGY (Code No. GKV-107)

Note :

(i) Paper setter shall set 50 questions from the syllabus and each question shall carry one mark.

(ii) Normally ten questions should be set from each unit of the prescribed syllabus for RET.

Unit- I

(i) Sources of ancient Indian History writing.

(ii) Harappan civilization –origin & extent, dating, town planning, political status, socio-economic life, religious beliefs, decline.

(iii) Rigvedic & Later Vedic periods – Political status, socio-economic life, Religious and Philosophical beliefs.

Unit-II

(i) Mahajanpadas – Sodasa Mahajanpadas and Republics, their political status, origin of Magadh Empire (from Haryak to Nanda dynasty).

(ii) Religious Movements and Foreign Invasions – origin and extent of Jainism and Buddhism, Ajivakas Iranian and Macedonian invasion.

(iii) Mauryan Empire – origin, Chandragupta Maurya, Ashok and his Dhamma, Administration, Socio-economic conditions, Inscriptions, Decline.

Unit-III

(i) Post Mauryan Period – Shungas, Kanvas, Shakas, Kushanas, Satavahanas and Sangam age.

.(ii) Gupta, Vakataka and Pushyabhuti – Origin and Decline, Administration, literature, science and technology, Hun's invasion (Torman and Mihirkul).

(iii) Early Medieval Period – Chalukyas of Vatapi, Palas, Gurjar – Pratihars, Chandelas, Parmar, Rashtrakuts, Pallavas, Cholas, Kalchuris, Gahadwals, Chahamans, Arab and Turkish invasion.

Unit-IV

(i) Indian Pre-historic Art.

(ii) Maurya's, Sunga's, Gupta's, Pratihara's and Chandela's art & architecture.

(iii) Pallava's , Chalukya's and Chola's art, architecture.

Unit-V

(i) History of archaeology in Global & Indian context.

(ii) Exploration & Excavation methods, dating techniques.

(iii) Indian Pre & Protohistory – Palaeolithic, Mesolithic, Neolithic, Chalcolithic & Iron age culture.

PSYCHOLOGY
(Code No. GKV-108)

Note :

(i) Paper setter shall set 50 questions from the syllabus and each question shall carry one mark.

(ii) Normally ten questions should be set from each unit of the prescribed syllabus for RET.

UNIT-1. Perceptual & Learning Processes

Approaches to the Study of Perception: Gestalt and physiological approaches.
Perceptual Organization: Gestalt, Figure and Ground, Laws of Organization.
Perceptual Constancy: Size, Shape and Brightness, Illusion.
Concept of Conditioning& Learning.
Classical Conditioning: Procedure, Phenomena and related issues.
Instrumental Learning: Phenomena, Paradigms and theoretical issues.
Verbal learning: Methods and materials.

UNIT-2. Memory and Forgetting

Concept of Memory
Memory Processes: Encoding, Storage, Retrieval.
Stages of Memory: Sensory memory, Short – term Memory (STM) and Long – term Memory (LTM).
Episodic and Semantic memory.
Theories of Forgetting: Interference, decay, retrieval.

UNIT-3. Motivation and Emotion

Basic Motivational Concepts: Instincts, needs, drives, incentives, motivational cycle.
Approaches to the Study of Motivation: Psychoanalytical, humanistic.
Biological Motives: Hunger & thirst.
Social Motives: Achievement, affiliation.
Theories of Emotions: James – Lange, Canon – Bard, Schachter and Singer.
Conflicts: Sources and types.

UNIT-4. Intelligence & Personality

Intelligence: Biological, Social, Eco – cultural determinants.
Theories of Intelligence: Spearman, Thurston, Guilford.
Individual and group differences: Extent and causes.
Determinants of Personality: Biological and socio – cultural.
Approaches to the study of Personality: Psychoanalytic, neo – freudian, social learning, trait and type.
Self – Concept: Origin and development.

UNIT-5. Research Methods, Measurement and Testing

Research Problems, Hypothesis, Variables and their operationalization.
Types of Psychological Research.
Methods of Psychological Research: Experimental, Quasi – experimental, Case studies& Field studies.
Methods of Data-Collection: Observation, Interview & Questionnaire.
Test Construction: Item-writing, Item-analysis.
Test Standardization: Reliability, Validity and Norms.
Types ofTests: Intelligence, Personality characteristics and important examples.

MANAGEMENT
(Code No. GKV-109)

Note :

(i) Paper setter shall set 50 questions from the syllabus and each question shall carry one mark.

(ii) Normally ten questions should be set from each unit of the prescribed syllabus for RET.

UNIT-I

Determinants of Organizational Structure, Parameters of Organizational Design; Emerging Organizational Design, Organization and Environment, Organizational Culture, Organizational Learning and Transformation, Process of Organizational Change. Concepts, Nature, Scope and significance of HRM, Evolution,Human Resource Management in a Changing Environment. Human Resource Planning,Job analysis, Training and Development, Performance Appraisal and Potential Appraisal, Job Evaluation, Wage and salary administration, Employee Welfare

UNIT-2

Marketing Environment, Theories of Consumer Behaviour, STP, Product Decisions, Promotion decisions,Techniques of marketing controller, Globalization, Consumerism, Green marketing, Legal, Ethical and Social Aspects of Marketing: Consumerism; Consumer Protection Measure in India; Recent Developments in Consumer Protection in India, Rural marketing, e-marketing, retailing.

Introduction to Vedas, Code of ideal human conduct, Self-management, Management of Men and Motivation-as viewed in Vedic Philosophy, Managerial and Corporate Excellence, Business Ethics, Managing Ethics, Ethical Decision-Making, Indian Ethos for Management, Value-Oriented Holistic Management. Theory of Karma Siddhanta, Gita and the Art of Successful Management, Individual Discipline, Family and Social Discipline, National Discipline.

UNIT-3

Managerial Economics, Balance of Payments, Monetary

Policy, FiscalPolicy, Contract Act, 1872,Companies Act, 1956,Time Series Analysis and Forecasting Process of Business Communication, Accounting Ratios, Computer Security, The Business Environment, Linear Programming.

EXIM Operations and Documentation, Foreign Exchange Facilities and Regulations: Trade Finance, Central Excise Clearance: Excise duty ,Central Excise Tariff Act; Valuation,Customs Clearance of Export and Import Cargo, Decision to invest in portfolio, Currency and Interest Rate Risk Management, Problem of debt servicing and developing countries, India's Foreign Trade in the Global Context, Rationale for going international.

UNIT-4

The Entrepreneurial Process, Entrepreneurship and Economic Development, theories of entrepreneurship, Entrepreneurial Development Programme in India, Entrepreneur VS Intrapreneurship, Ethics and Social Responsibilities of Entrepreneurs, Women Entrepreneurship, Legal Framework, Business Plan Development, raising Funds, Registering SSI Unit Business. Concepts of Financial Management, Techniques of Financial Management, Time Value of Money, Capital Budgeting, Working Capital Management, Cost Volume Profits Analysis.

UNIT 5

Managing Operations, Designing of Products, Services & Processes, Production and Operation standards and Work Measurement, Scheduling System, Aggregate Planning for Production and Services, Inventory Control, MRP, Purchasing, JIT, KANBAN, FMS, TQM

Management Information Systems, System Development Stages, Concept of Decision Making,ConceptualModelof DSS, Database Management System (DBMS), Modelbase Management System (MBMS) and Dialogue Generation Management System(DGMS),Group Decision Support System(GDSS), Components of GDSS, DSS Generators, DSS Tools,Comparison between MIS and DSS.

PHYSICS
(Code No. GKV-110)

Note :

(i) Paper setter shall set 50 questions from the syllabus and each question shall carry one mark.

(ii) Normally ten questions should be set from each unit of the prescribed syllabus for RET.

UNIT-I

Mathematical Physics

Linear algebra, matrices, Cayley Hamilton theorem, eigenvalue problems; Linear differential equations; Special functions (Hermite, Bessel, Laguerre and Legendre); Fourier series, Fourier and Laplace transforms; Elements of complex analysis: Laurent series-poles, residues and evaluation of integrals; Elementary ideas about tensors; Elements of computational techniques: roots of functions, interpolation, extrapolation, integration by trapezoidal and Simpson's rules, solution of first order differential equations using Runge-Kutta method; Finite difference methods.

Classical Mechanics

Variational principle, Lagrangian and Hamiltonian formalisms and equations of motion; Poisson brackets and canonical transformations; Symmetry, invariance and conservation laws, cyclic coordinates; Central-force motion; Two-body collisions, scattering in laboratory and centre-of-mass frames; Rigid body dynamics, moment of inertia tensor; Periodic motion, small oscillations and normal modes; Special theory of relativity, Lorentz transformations, relativistic kinematics and mass–energy equivalence.

UNIT-II

Electromagnetic Theory

Electrostatics: Gauss' Law and its applications; Laplace and Poisson equations, boundary value problems; Magnetostatics: Biot-Savart law, Ampere's theorem, electromagnetic induction; Maxwell's equations in free space and linear isotropic media; boundary conditions on fields at interfaces; Scalar and vector potentials; Gauge invariance; Electromagnetic waves in free space, dielectrics, and conductors; Reflection and refraction, polarization, Fresnel's Law; Dispersion relations in plasma; Transmission lines and wave guides; Dynamics of charged particles in static and uniform electromagnetic fields; Radiation from moving charges, dipoles and retarded potentials.

Quantum Mechanics

Wave-particle duality; Wave functions in coordinate and momentum representations; Commutators and Heisenberg's uncertainty principle; Matrix representation; Dirac's bra and ket notation; Schroedinger equation (time-dependent and time-independent); Eigenvalue problems such as particle-in-a-box, harmonic oscillator, etc.; Tunneling through a barrier; Motion in a central potential; Orbital angular momentum, Angular momentum algebra, spin; Addition of angular momenta; Hydrogen atom, spin-orbit coupling, fine structure; Time-independent perturbation theory and applications; Variational method; WKB approximation; Time dependent perturbation theory and Fermi's Golden Rule; Selection rules; Semi-classical theory of radiation; Elementary theory of scattering, phase shifts, partial waves, Born approximation; Identical particles, Pauli's exclusion principle, spin-statistics connection; Relativistic quantum mechanics: Klein Gordon and Dirac equations.

UNIT-III

Statistical Mechanics

Laws of thermodynamics and their consequences; Thermodynamic potentials, Maxwell relations; Chemical potential, phase equilibria; Phase space, micro- and macrostates; Microcanonical, canonical and grand-canonical ensembles and partition functions; Free Energy and connection with thermodynamic quantities; First- and second-order phase transitions; Classical and quantum statistics, ideal Fermi and Bose gases; Principle of detailed balance; Blackbody radiation and Planck's distribution law; Bose-Einstein condensation.

UNIT-IV

Experimental Techniques and data analysis

Data interpretation and analysis; Precision and accuracy, error analysis, propagation of errors, least squares fitting, linear and nonlinear curve fitting, chi-square test; Transducers (temperature, pressure/vacuum, magnetic field, vibration, optical, and particle detectors), measurement and control; Signal conditioning and recovery, impedance matching, amplification (Op-amp based instrumentation amp, feedback); Hall effect, four probe and Vander-Paw methods; X-ray diffraction technique.

Applications of the above experimental and analytical techniques to typical undergraduate and graduate level laboratory experiments.

Electronics

Semiconductor diodes, transistors, CE, CB and CC amplifiers, FET & MOSFET characteristics, Frequency effects and applications; OP-AMP theory, Negative feedback, Linear and non-linear OP-AMP circuits, Oscillators and timers, Thyristers; Logic gates, HA, FA.

Atomic & Molecular Physics

Quantum states of an electron in an atom; Electron spin; Stern-Gerlach experiment; Spectrum of Hydrogen, helium and alkali atoms; Relativistic corrections for energy levels of hydrogen; Hyperfine structure and isotopic shift; width of spectral lines; LS & JJ coupling; Zeeman, Paschen Back & Stark effect; X-ray spectroscopy; Electron spin resonance, Nuclear magnetic resonance, chemical shift; Rotational, vibrational, electronic, and Raman spectra of diatomic molecules; Frank – Condon principle and selection rules; Spontaneous and stimulated emission, Einstein A & B coefficients; Lasers, optical pumping, population inversion, rate equation.

UNIT-V Condensed Matter Physics

Bravais lattices; Reciprocal lattice, diffraction and the structure factor; Bonding of solids; Elastic properties, phonons, lattice specific heat; Free electron theory and electronic specific heat; Response and relaxation phenomena; Drude model of electrical and thermal conductivity; Hall effect and thermoelectric power; Diamagnetism, paramagnetism, and ferromagnetism; Electron motion in a periodic potential, band theory of metals, insulators and semiconductors; Superconductivity, type – I and type - II superconductors, Josephson junctions; Defects and dislocations; Ordered phases of matter, translational and orientational order, kinds of liquid crystalline order.

Nuclear and Particle Physics

Basic nuclear properties: size, shape, charge distribution, spin and parity; Binding energy, semi-empirical mass formula; Liquid drop model; Fission and fusion; Nature of the nuclear force, form of nucleon-nucleon potential; Charge-independence and charge-symmetry of nuclear forces; Isospin; Deuteron problem; Evidence of shell structure, single- particle shell model, its validity and limitations; Rotational spectra; Elementary ideas of alpha, beta and gamma decays and their selection rules; Nuclear reactions, reaction mechanisms, compound nuclei and direct reactions; Classification of fundamental forces; Elementary particles (quarks, baryons, mesons, leptons); Spin and parity assignments, isospin, strangeness; C, P, and T invariance and applications of symmetry arguments to particle reactions, parity non-conservation in weak interaction.

CHEMISTRY

(Code No. GKV-111)

Note:

(i) Paper setter shall set 50 questions from the syllabus and each question shall carry one mark.

(ii) Normally ten questions should be set from each unit of the prescribed syllabus for RET.

UNIT- I

Coordination Chemistry: Molecular orbital theory as applied to octahedral complexes, pi - bonding in octahedral complexes; cis and trans isomerism in square planar and octahedral complexes. Term symbols S,P,D,F, in a cubic field; splitting of term for d configuration; spectra of Transition metal complexes, selection rules and intensities of the transitions, nature of Electronic transitions in complexes, Calculation of Dq, B' and beta for Cr (III) and Ni (II) complexes. Structural Evidence from Electronic spectra, charge-transfer spectra.

Bioinorganic Chemistry General introduction to Bio-inorganic Chemistry; occurrence of Inorganic elements in organisms, classification of metallo bio-molecules; Biologically important features and functions of inorganic elements, Biologically important ligands for metal ions, co-ordination by proteins and Enzymatic catalysis.

(a) Role of metal ions (An overview) in Biological systems Na, K, Ca, Mg & Zn (Giving suitable examples) Biomineralisation.

(b) Role of non-metals in Biological systems, viz; Cl, B, Si, As, Br, F, I, Se (Giving suitable examples)

UNIT- II

Electromagnetic spectrum, Electronic band spectra (UV and Vis region), Lambert's law, Beer's law, Beer's-Lambert law, Extinction coefficient, idea of Bathochromic and Hypsochromic shifts, Hyperchromic and Hypochromic effects, Instrumentation, Simple and general applications of UV-Vis spectroscopy to organic compounds. Vibrational rotational spectra- Principle, absorption of infrared radiation & molecular vibration. Fundamental vibrations and overtones. Infrared vibration - active and forbidden (Selection rules). Instrumentation, simple and general applications of I. R.

spectroscopy. Atomic Absorption spectroscopy, flame photometric methods of estimation of alkali and alkaline metals.

NMR Spectroscopy: Basic concept, Low resolution & high resolution nmr; chemical shift, coupling constant, shielding & deshielding, Simple application of pmr. E.S.R. spectra of transition metal complexes, spin Hamiltonian, Instrumentation and application of E.S.R. and NMR spectroscopy. Mass spectroscopy: Basic idea, Principle of operation of mass spectrometer, Instrumentation, fragmentation pattern of major functional groups, simple general applications.

UNIT- III

Treatment of Data in Quantitative Analysis: Accuracy, Precision, Standard deviation, Types of errors, Elimination of errors, Significant figures, Rejection quotient test. Polarisation, Overvoltage, Theories of Hydrogen overvoltage, Ilkovic equation, d.m.e., Half wave potential, Diffusion current, Polarography and its simple and general applications (Specific applications not required). Ion Exchange: Cation and Anion exchangers, their Stability, Selectivity and Characteristics. General applications including ion exchange chromatography. Theory, technique and applications of Conductometric, Potentiometric and pH- metric titrations.

Solvent Extraction: Principles, Techniques and applications. Chromatographic techniques: Basic principles, experimental techniques, and simple and general applications of Column, Paper, Thin layer, Gas-solid, Gas- liquid and High-Performance Liquid Chromatography.

UNIT- IV

Physico-chemical analysis of water samples for turbidity, conductivity, total solids, filterable, nonfilterable, fixed and volatile solids, pH, total carbonate, bicarbonate and total alkalinity, B.O.D., C.O.D., D.O., NH_3, NO_3, NO_2, organic N_2, total N_2, Inorganic phosphates, silica, SO_4 - -, Hardness (Ca and Mg), Na, K, residual Chlorine; Optimum alum dose. Treatment and analysis of soil samples for porous nature, water absorbing capacity, loss on ignition, pH, conductance, cation exchange capacity, chlorides, sulphates, soluble carbonates and bicarbonates, total organic matter, available phosphorus, available nitrogen, nitrogen by Kjeldahl's method, exchangeable Na and K.

Oils and Fats: General idea, Classification, Occurrence, Basic idea of the function of oils and fats, Physical and chemical properties of oils and fats, Applications of oils and fats. Analysis of oils and fats: Determination of physical constants like M.P. and B.P., Specific gravity, Refractive index, Total volatile matter, Determination of Acid value, Iodine value, R.M. value, Polenske number.

Soaps and detergents: Idea of common soaps, Cleansing action of soaps, Varities of soaps and their uses, Idea of detergents, Hazards of soaps and detergents. Analysis of soaps and detergents: Determination of Matter insoluble in alcohol, Free alkali and free acids, Matter insoluble in water, Glycerol content (Dichromate method), Foaming capacity and its comparison in different samples of soaps and detergents, Effect of sodium carbonate on the foaming capacity of soap.

UNIT- V

Chemical Kinetics: Derivation of IIIrd order kinetic equation, collision theory for uni, bi and termolecular reactions, Steric factor, Theory of absolute reaction rates, Entropy of activation. Experimental techniques for the study of kinetics of slow and fast reactions. Potential energy surfaces (two-dimentional and three-dimentional diagrams), P.E. surface for H + H_2 reaction, Concept of COL and Contour diagram. Opposing, Consecutive, Side and Induced reactions, Induction period. Chain reactions and explosion limits. Reactions in solution, Factors affecting the rates in solutions, effect of solvation and Internal pressures, Double and Single sphere models, Effect of ionic strength, Bronsted-Bjerrum equation.

Macromolecules: Addition and condensation polymerisation. Degree of polymerisation and length of polymer chains. Requirement of purity for synthesis. Molecular weights and their distribution. Polydispersity. Determination of molecular weight by Osmotic pressure, Viscosity, light scattering and sedimentation equilibrium methods.

Free radical vinyl polymerization, ionic vinyl polymerization, Ziegler-Natta polymerization and vinyl polymers. Polyesters, polyamides, phenol formaldehyde resins, urea formaldehyde resins, epoxy resins and polyurethanes. Natural and synthetic rubbers.

MATHMATICS

(Code No. GKV - 112)

Note :

(i) Paper setter shall set 50 questions from the syllabus and each question shall carry one mark.

(ii) Normally ten questions should be set from each unit of the prescribed syllabus for RET.

UNIT – I Real Analysis and Complex Analysis

Countable and uncountable sets, Real number system as a complete ordered field, Archimedean property, supremum, infimum, Sequence, convergence, Cauchy convergence criterion for Sequence, limsup, liminf, Bolzano-Weierstrass theorem. Infinite series, Cauchy convergence criterion for series, positive term series, convergence of p-series, tests of convergence of series, alternating series, Leibnitz's test. Definition and examples of absolute and conditional convergence.

Sequences and series of functions, pointwise and uniform convergence, M_n-test, M-test, Continuity, uniform continuity, types of discontinuity, integrability and differentiability of functions, mean value theorem, power series and radius of convergence.

Metric spaces: Open and closed set, continuity, connectedness, complete metric space, Cantor's intersection theorem, compact metric space.

Normed linear spaces, spaces of continuous functions and related examples.

Analytic functions, Cauchy-Riemann equations, Contour integral, Cauchy's theorem, Cauchy's integral formula, Liouville's theorem, maximum modulus principle, Schwartz lemma, Open mapping theorem, Taylor series, Laurent series, calculus of residues.

UNIT– II Algebra

Vector spaces, subspaces, linear dependence, basis, dimension, algebra of linear transformations, algebra of matrices, rank and determinant of matrices, linear equations, eigenvalues and eigenvectors, Cayley-Hamilton theorem, matrix representation of linear transformations, change of basis, canonical forms, diagonal forms, triangular forms, Jordan forms, inner product spaces, orthonormal basis, quadratic forms.

Groups, subgroups, Lagrange's Theorem, normal subgroups, quotient groups, homomorphisms, isomorphisms, cyclic groups, permutations groups, Cayley's theorem, class equations, Cauchy theorem, Sylow's theorems, Rings, ideals, prime and maximal ideals, quotient rings, polynomial rings, integral domains, fields.

UNIT – III Differential Equations

Existence and uniqueness of solutions of initial value problems for first order ordinary differential equations, singular solutions of first order ODEs, system of first order ODEs, general theory of homogenous and non-homogeneous linear ODEs, variation of parameters, Sturm-Liouville boundary value problem.

Lagrange and Charpit methods for solving first order PDEs, Cauchy problem for first order PDEs, and classification of second order linear PDEs, method of separation of variables of Laplace equation.

UNIT – IV Numerical Analysis

Errors, Numerical solutions of algebraic equations, regula-falsi method, secant method, method of iteration and Newton-Raphson method, rate of convergence, solution of systems of linear algebraic equations using Gauss elimination and Gauss-Seidel methods, finite differences, Interpolation for evenly spaced and unevenly spaced points.

Numerical differentiation and integration, numerical solution of ODEs using Picard, Euler, modified Euler and Runge-Kutta methods.

UNIT – V Operation Research and Statistics

Linear programming problem, Graphical method, Convex Sets, simplex method, optimality and unboundedness, introduction to artificial variables, two-phase method, Big-M method and their comparison. Duality, formulation of the dual problem, primal-dual relationships.

Transportation problem: Northwest-corner method, least cost method and Vogel approximation method for determination of starting basic solution of transportation problem, Assignment problem: Hungarian method for solving assignment problem.

Game theory: Solving two person zero sum games, games with mixed strategies, graphical solution procedure.

Convex functions, K-T conditions, quadratic programming.

Sample space, discrete probability, independent events, Bayes' Theorem, random variables and distribution functions, expectation and moments, independent random variables, Standard discrete and continuous univariate distributions, Poisson, Binomial and Normal distributions. Curve fitting, regression and correlation.

COMPUTER SCIENCE

(Code No. GKV - 113)

Note :

(i) Paper setter shall set 50 questions from the syllabus and each question shall carry one mark.

(ii) Normally ten questions should be set from each unit of the prescribed syllabus for RET.

Unit-I (Algorithm Design and Analysis)

Elementary data structures; Divide and conquer method: Binary search, Finding maximum and minimum, Merge sort; Greedy method: Knapsack problem, Job sequencing with deadlines, Optimal merge patterns; Dynamic programming: Multistage graphs, Optimal binary search trees, 0/1 Knapsack, Reliability design, Traveling salesperson problem; Backtracking:

8- queens problem, Sum of subsets, Hamiltonian cycles, Knapsack problem; Basic search and traversal techniques: techniques, Code optimization, Bi-connected components and Depth- first search; Non--deterministic algorithm: Non-deterministic programming constructs, Simple non-deterministic programs; NP-hard and NP-complete problems.

Unit-II (Computer Networks)

Analog and digital signals, Periodic analog signals, Transmission impairment, Data rate limits, Performance. Digital transmission: Analog to digital conversion, Transmission modes. Analog transmission: Digital to analog conversion, Analog to analog conversion. Bandwidth utilization: Multiplexing and spreading. Transmission media: Guided and unguided. Dial-up modems and ADSL. Types of error, Redundancy, Forward error correction and retransmission, Hamming distance, CRC, Polynomials, Checksum. Data link control: Framing, Flow and error control, Simplest protocol, Stop-and-wait protocol, Stop-and-wait ARQ, Go-back-n ARQ, Selective repeat ARQ, Piggybacking. Multiple access: CSMA, CSMA/ CD, CSMA/ CA. Standard ethernet.Bridges: Requirement, Transparent bridge, Source routing bridge. IEEE 802.11. Switching: Circuit- switched networks, Datagram networks, Virtual-circuit networks. Internet protocol version 4, Address mapping, Delivery, Forwarding and routing of IP packets. Unicast routing protocols: Distance routing protocol, Link state routing.

Unit-III (Software Engineering)

SDLC models, Selection of a life cycle model; Software requirements analysis and specifications: Requirements engineering, Requirements elicitation, Requirements analysis, Requirements documentation; Software project planning: Size estimation, Cost estimation, models, Constructive cost model, Software risk management; Software design: Design definition, Modularity, Strategy of design, Function oriented deign, IEEE recommended practice for software design description, Object oriented design; Software metrics: Software metrics, Token count, Data structure metrics, Information flow metrics, Metrics analysis; Software reliability: Basic concepts, Software quality, Software reliability models, Capability maturity model; Software testing: Testing process, Functional testing, Structural testing, Levels of testing, Debugging, Testing tools; Software maintenance: Maintenance process, Maintenance models, Estimation of maintenance costs, Regression testing, Reverse engineering, Software re-engineering, Configuration management.

Unit-IV (Operations Research)

Linear programming, Simplex method, Standard LP form and its basic solutions, Simplex algorithm; Duality: dual problems, Relationship between the optimal primal and dual solutions, Dual simplex method, Primal dual computation; Transportation and assignment model: Transportation model, Non- traditional transportation model, Transportation algorithms, Assignments model; Deterministic dynamic programming: Recursive nature of computing, Forward and backward recursion; Queuing theory: Queuing system, Characteristics of queuing models, Transient and steady state of queuing system, Birth- death process, Pure birth & pure death processes, (M/M/1) : (FCFS/∞/∞), (M/M/1) : (FCFS/N/∞), (M/M/S) : (FCFS/∞/∞) and (M/M/S) : (FCFS/ N/∞) Models.

Unit-V (Current Trends and Technologies)

Mobile computing : Mobile connectivity, Cells, Framework, Wireless delivery technology and switching methods, Mobile information access devices, Mobile data internetworking standards, Cellular data communication protocols, Mobile computing applications; Mobile databases - protocols, Scope, Tools and technology.

Security and Cryptography: Introduction to security, Security attacks, Services and mechanisms, Data encryption standard, Advanced encryption standard, Public- key cryptography and RSA, Message authentication and Hash functions, Hash and MAC algorithms, Digital signatures and authentication protocols; Network security : Authentication applications, Electronic mail security, IP security, Web security, Intruders, Malicious software, Firewalls.

ZOOLOGY

(Code No. GKV - 114)

Note :

(i) Paper setter shall set 50 questions from the syllabus and each question shall carry one mark.

(ii) Normally ten questions should be set from each unit of the prescribed syllabus for RET.

UNIT-1: Animal Cytology and Molecular Biology

Cellular Organization, Membrane structure and function, Structural organization and function of intracellular organelles, Organization of genes and chromosomes, Cell division and cell cycle, DNA & RNA: structure, synthesis and processing, Protein synthesis and processing, Genetic code, Control of gene expression at transcription and translation level.

UNIT – II: Animal Physiology & Embryology

Digestive system, Enzymes, Blood circulation, Cardiovascular system, Respiratory system, Excretory system, Nervous system, Sense organs, Thermoregulation, Endocrinology and reproduction, Developmental Biology: Spermatogenesis, Oogenesis, Cleavage, Blastulation, Gastrulation, Embryogenesis, Placentation in Mammals.

UNIT- III: Animal Genetics & Biotechnology

Inheritance Biology, Mendelian principles, Extensions of Mendelian principles, Gene mapping methods, Human genetics, Quantitative genetics, Mutation, Structural and numerical alterations of chromosomes, Animal biotechnology : Recombinant DNA technology Gene amplification, Transgenic animals, Genetic engineering & its applications, Plasmids, Gene cloning, Immunotechnology : immune system, antibodies, interferons & vaccines.

UNIT- IV: Ecology and Evolution

Ecological Principles, Environment & Ecosystem: Concept, composition & factors; Habitat and niche, Population ecology, Species interactions, Community ecology, Ecological succession, Ecosystems: Lentic, lotic and its functioning, Biogeography, Evolution and Behaviour, Origin of cells and unicellular evolution, Palaeontology and evolutionary history, Diversity of Life forms, Principles and methods of taxonomy, Molecular Evolution, Concept of biological species.

UNIT- V: Biostatistics & Instrumentation

Statistical Methods: Measures of central tendency and dispersal, probability distributions : Binomial, Poisson and Normal, Sampling distribution, Difference between parametric and non-parametric statistics, Confidence interval, Errors, Levels of significance, Standard deviation, ANOVA, Regression and correlation, t-test; Analysis of variance, X_2 test.

Instrumentation: Microscopy (SEM & TEM), Titrimetry, Gravimetry, Colourimetry, Spectrophotometry, Atomic Absorption Spectrophotometry (AAS) , Chromatography: Gas Chromatography, GLC, HPLC, Electrophoresis, Flame photometry, PCR (Polymerase chain reaction).

ENVIRONMENTAL SCIENCE
(Code No. GKV - 115)

Note :

(i) Paper setter shall set 50 questions from the syllabus and each question shall carry one mark.

(ii) Normally ten questions should be set from each unit of the prescribed syllabus for RET.

Unit – I: Ecology & Ecosystem

Fundamental concept of ecology & Ecosystem, Biogeochemical cycles, structure & composition of atmosphere, hydrosphere, lithosphere & biosphere, population ecology, population dynamics & interactions, Community ecology, Ecological energy budget, Energy flow, Law of thermodynamics, Ecosystem productivity, Ecological adaptations, Zoo-geographical classification, Biodiversity hot spots, Biological diversity and its conservation methods, IUCN categories, Wild life concepts and management, Protected area networks, Environmental ethics.

Unit – II: Environmental Pollutions

Air pollution: Sources, factors, chemical composition of air, chemistry of air pollutants, Ozone depletion & Global Warming, photochemical smog, Monitoring methods of air pollutions, Air quality index & standards.

Water pollution: Sources, Types, Water chemistry, Eutrophication, Heavy metals & pesticides in water, Monitoring methods of water & waste water pollutions, Water quality index and standards.

Terrestrial (Soil) pollution: sources, types, soil chemistry, bio-indicators of soil pollution, PAN, Pesticides, Monitoring methods of soil pollutions. Bio-pesticides and their applications.

Radio-active pollution: Sources, types, biological effects of radiations, monitoring methods of radio-active methods, Radio-nuclides in Environment.

Marine pollution: Sources, types, and its mitigation, Noise pollution and its abatement measures.

Unit–III: Environmental resources management

Renewable and Non renewable resources, Principal forest resources and their conservation, Ethno-Medicinal resources, Mineral resources, Ocean resources, Water resources & their conservation methods, Solar resources, Fossil fuels, Biofuels, Energy resources: Ocean, Thermal, Nuclear, Geothermal, Natural gas, Hydro-power generation, Atomic energy, Wind energy. Energy audit mechanism, Carbon footprint, Watershed management, land use pattern, Environmental hazards & disasters and their management, Application of Environmental biotechnology in resource management, Biological resources of Himalayan regions.

Unit–IV: Environmental Laws, policies and EIA

Basic concepts of Indian Environmental law and policies, Environment (Article 48A and 51A), Environment Policy Resolution, Legislation, Public Policy Strategies in Pollution control, Wildlife Protection Act, 1972 amended 1991; Forest Conservation Act, 1980 Indian Forest Act (Revised) 1982; Air (Prevention and control of pollution) Act, 1981 as amended by amendment Act, 1987 and Rule 1982; Motor Vehicle Act, 1988; The water (Prevention and control of pollution) Act, 1974, as amended up to 1988 and rules 1975; The Environment (Protection) Act., 1986 and rules 1986, National biodiversity act,2002. Fundamental principles of environmental impact assessment, EIA guidelines 1994, Impact Assessment Methodologies, Procedure for reviewing Environmental impact analysis and statement, Environmental audit, Environmental planning, Concept and strategies of sustainable development. Ecological footprint.

Unit–V: Environmental modelling and instrumentation

Introduction to environmental system analysis; approaches to development of models; ANOVA, Standard deviations, linear simple and multiple regression models, validation and forecasting. Models of population growth and interactions-Lotka-Volterra model, Leslie's matrix model, point sources stream pollution model, box model, Gaussian plume models, Fundamental concepts & principles of ecological modelling, Applications of remote sensing and GIS in environmental management, Biodiversity indices.

Principles of Analytical Methods: Titrimetry, Gravimetry, Colourimetry, Spectrophotometry, Atomic Absorption Spectrophotometry, Chromatography: Gas chromatography, GLC, HPLC, Electrophoresis, Flame photometry, PCR (Polymerase chain reactions).

BOTANY
(Code No. GKV-116)

Note :

(i) Paper setter shall set 50 questions from the syllabus and each question shall carry one mark.

(ii) Normally ten questions should be set from each unit of the prescribed syllabus for RET.

UNIT-I: Cell Biology and Genetics

Structure and function of cell and cell organelles, mitosis and meiosis; DNA as genetic material, mechanisms and regulation of prokaryotic and eukaryotic DNA replication, transcription, translation; DNA replication in prokaryotes and eukaryotes,

enzymes and accessory proteins involved in DNA replication; different models of DNA replication; origin of replication, replicon, priming, initiation and elongation; enzyme involved in DNA replication.

Principles of Mendelian inheritance; chromosome structure and function; gene structure, regulation of gene expression; linkage, crossing over, Griffith's experiment of transformation, Hershey and Chase experiment, Avery-McLeod - McCarty experiment, conjugation, transformation; cytoplasmic inheritance, recombination and chromosome mapping in eukaryotes; sex chromosomes and sex determination, dosage compensation of X-linked gene; karyotyping, polyploidy and aneuploidy.

UNIT-II: Physiology and Biochemistry

Fundamentals of biochemistry, concept of pH, acids, bases and buffers; enzymes- introduction, mechanism of activity, nomenclature, enzyme catalytic mechanism, factors affecting enzyme activity; classification of enzyme; amino acids; carbohydrate-monosaccharide's, polysaccharides; fatty acids. Response of plants to biotic and abiotic stresses; active and passive transport across membrane; plant growth hormones and their mechanism of action; photosynthesis- light harvesting complexes, mechanisms of electron transport, CO_2 fixation-C_3, C_4 and CAM pathways; respiration and photorespiration-citric acid cycle, mitochondrial transport and ATP synthesis; nitrogen metabolism.

UNIT-III: Plant Tissue Culture

Introduction to cell and tissue culture techniques; micropropagation; somatic embryogenesis; totipotency; hybrid and cybrids; organ culture, protoplast culture and organogenesis; shoot-tip culture; production of virus-free plants; GM plants- generation and maintenance of transgenic plants; Isolation, culture and preservation of protoplast, protoplast fusion and somatic hybridization, selectable genetic markers and biochemical markers.

UNIT-IV: Microbiology

Spontaneous generation, germ theory of diseases, Koch's, postulates; general characteristic of fungi, algae, cynabacteria, rickettsiae, mycoplasma, spirochetes and archeobacteria; basic concept of classification of microorganism, Haeckel's three kingdom concept, Whittaker's five kingdom concept, molecular approaches in microbial classification, classification and silent features of bacteria based on Bergey's manual of Determinative bacteriology; Gram-negative, Gram-positive eubacteria. Discovery of viruses, ultrastructure, capsid and its arrangements, types of envelopes and its composition; viral genomes, its type and structure; TMV and HIV viruses; prions- spread of prions and diseases; lytic and lysogenic cycle, T_4, phage lambda and M13; plant viruses (TMV)and animal viruses (Rabies, HIV).

UNIT V: Mycology, Plant Pathology and Statistics History and development of mycology; general account of myxomycota, Eumycota, Ascomycotina, Basidiomycotina and Deuteromycotina; history of plant pathology; pathogenesis; symptoms of plants diseases; causes, diagnosis and stage of development of plant diseases; Early and late blight of potato; loose smut of wheat, false smut of paddy, Fusarium wilt, powdery mildew of pea; red rot of sugarcane; stem an root rot disease of crops.

Measures of central tendancy and dispersal; probability distribution (Binomial, poisson and Normal), sampling distribution, difference between parametric and non-parametric statistics, confidence interval; errors; level of significance' regression and correlation; t-test, analysis of variance, chi-square test.

MICROBIOLOGY
(Code No. GKV - 117)

Note :

(i) Paper setter shall set 50 questions from the syllabus and each question shall carry one mark.

(ii) Normally ten questions should be set from each unit of the prescribed syllabus for RET.

UNIT-I: Isolation, Staining Techniques and Preservation of Microbial Culture

Different methods used for isolation of microbes from different sources/habitats by pour plate method, streak method and serial dilution methods, purification, identification, differentiation and preservation of microbial culture. Ingredients and preparation of various stains, Gram stain, flagella stain, endoscope stain, acid fast stain, carbolfuschin stain, cotton blue stain. Procedure for staining, Gram staining, Negative staining, flagella staining, acid fast staining, nucleoid staining, fungal staining.

UNIT-II: Bioremediation and Microbial Diversity

Sources of water pollution, methods for selection of sites, survey of area, detection of sampling point, preparation of reagents, sampling program, type of sample to be collected, analysis for physical parameters (i.e. temperature, turbidity), chemical parameters (such as CO_2, Nitrogen content, DO, BOD, COD) MPN, and SPC etc., methods for estimation of heavy metals such as Cr etc., in-situ and ex-situ bioremediation, role of macrophytes and microbes in bioremediation, structural, functional and genomic diversity, determination of microbial diversity, phylogenetic relationship of microorganisms, types of dendrogram , software used in preparation of dendrogram (e.g. MVSP, NTSys, Mega Version-4), gene bank, NCBI.

UNIT-III: Genetics and Evolution

Mendelian Inheritance; Incomplete dominance, Co-dominance, Multiple alleles and Inheritance of blood groups, Pleiotropy; Elementary idea of polygenic inheritance; Chromosome theory of inheritance; Chromosomes and genes; Linkage and crossing over. Origin of life; Biological evolution and evidences for biological evolution. Modern Synthetic theory of Evolution;

Natural Selection with examples, types of natural selection: Gene flow and genetic drift; Hardy-Weinberg's principle.

UNIT-IV: Soil Microbiology

Soil as a habitat for microorganisms, microflora of various soil types, Rhizosphere and rhizome microflora and its estimation, root exudates, its composition and effects on plants; Microbial interactions- symbiosis, mutualism, commensalisms, amensalism, competition, antibiosis; Actinorrhiza; Mycorrhizal fungi and its effect on plants. Biofertilizers (rhizobial inoculants, mass production and method of application); Biopesticides (viral, bacterial and fungal biopesticides.

UNIT-V: Instrumentation

Principles and function of microscopy-phase contrast microscope, scanning electron microscope, colorimetry and spectrophotometry (principle, colorimeter and spectrophotometer, construction of colorimeter, construction of spectrophotometer, spectrophotometric analysis, proportionality, graphing methods, beer's law equation method, design of spectrophotometer, single beam, double beam, split beam, errors on spectrophotometric analysis, biological application of UV-visible spectrophotometers, nucleic acid qualification, protein determination, enzyme kinetics, turbidity and nephelometry), polymerase chain reaction (PCR), techniques of DNA isolation and basic function and design of fermentor.

PHYSICAL EDUCATION
(Code No. GKV - 118)

Unit-I (Introduction to Physical Education)

Introduction, definition, aims and objectives of Physical Education.

Development of Physical Education from ancient to Morden, Olympic Movement, Countries organized the Morden Olympic, Arjun and Dronacharya Awradee till to date, World and Asian Championship.

Philosophical aspect of Physical Education-Idealism, Naturalism, Realism, Pragmatism, Existentialism and Humanism.

Body types: general principles of growth and development.

Psychological basis of Physical Education-Play and Play theories Principles of motor-skill acquisition, transfer of training effects.

Learning process-theories and laws of learning.

Motivation, theories and dynamics of motivation in sports.

Psychological factors affecting sports performance.

Personality: dimensions, theories and performance.

Individual differences. Group dynamics, team cohesion and leadership in sports.

Testing psychological variables-competitive anxiety, aggression, team cohesion, motivation, Self-concept. Sociological foundation of Physical education.

Unit-II (Biomechanical, Psychological and Managerial aspects of Physical Education

Physiology of Muscular activity, Neurotransmission and Movement mechanism. Physiology of respiration, blood circulation. Joints and their movements-planes and axes. Kinetics, Kinematics-linear and angular, levers. Laws of motion, principles of equilibrium and force, spin and elasticity.

Muscular analysis of Motor movement. Fundamental Movements. Mechanical analysis of (running, jumping, throwing, pulling and pushing). Athletic injuries-their management and rehabilitation.Posture, Postural deformities and their correction. Massage manipulation and therapeutic exercises. Therapeutic modalities. Bioenergetics and recovery process. Ergogenic aids and doping.

Unit-III (Professional, Health and Recreational approach of Physical Education)

Development of teacher education in Physical Education. Professional courses in Sports and Physical Education in India. Professional Ethics. Qualities and Qualifications of Physical Educational Personnel. Institute of physical education in India. Principles of curriculum planning. Age characteristics of pupils and selection of activities. Health-Guiding principles of health and health education. School health programme and personal hygiene Health-related fitness: Nutrition and dietary manipulations. Obesity and its management. Environmental and occupational hazards and first aid.

Communicable diseases and their prevention. Theories and principles of recreation.Recreation programme for various categories of people.

Unit-IV (Training and Motor Development)

Sports training: Characteristics and principles, Training load and Periodization. Training methods and specific training programme for development of various motor qualities. Technical and Tactical preparation for sports. Short-term and long-term training plans. Sports talent identification-process and procedures. Preparing for competition- (build up competitions, main competition, competition frequency, psychological preparation).

Unit-V (Test, Measurement and Evaluation)

Test, measurement and evaluation. Principles of measurement and evaluation: Construction and classification.

Criteria of test evaluation. Concepts and assessment of physical fitness, motor fitness, motor ability and motor educability. Skill test for Badminton, Basket ball, Hockey, Lawn-tennis, Soccer, Volley ball. List of tournaments organized by AIU, Role of Health Clubs and Gymnasium on morden aspects of physical fitness. Anthropometric measurements and body composition. Concept and principles of management. Organization and functions of sports bodies.

Intramurals and Extramurals. Management of infrastructure, equipments, finance and personnel. Methods and Techniques of teaching. Principles of planning Physical Education lessons. Pupil-teacher interaction and relationship.Concept of techniques of supervision.

SECTION B

APPLIED SCIENCE (PHYSICS)
(Code No. GKV-119)

Note :

(i) Paper setter shall set 50 questions from the syllabus and each question shall carry one mark.

(ii) Normally ten questions should be set from each unit of the prescribed syllabus for RET.

UNIT-I

Mathematical Physics

Linear algebra, matrices, Cayley Hamilton theorem, eigenvalue problems; Linear differential equations; Special functions (Hermite, Bessel, Laguerre and Legendre); Fourier series, Fourier and Laplace transforms; Elements of complex analysis: Laurent series-poles, residues and evaluation of integrals; Elementary ideas about tensors; Elements of computational techniques: roots of functions, interpolation, extrapolation, integration by trapezoidal and Simpson's rules, solution of first order differential equations using Runge-Kutta method; Finite difference methods.

Classical Mechanics

Variational principle, Lagrangian and Hamiltonian formalisms and equations of motion; Poisson brackets and canonical transformations; Symmetry, invariance and conservation laws, cyclic coordinates; Central-force motion; Two-body collisions, scattering in laboratory and centre-of-mass frames; Rigid body dynamics, moment of inertia tensor; Periodic motion, small oscillations and normal modes; Special theory of relativity, Lorentz transformations, relativistic kinematics and mass–energy equivalence.

UNIT-II

Electromagnetic Theory

Electrostatics: Gauss' Law and its applications; Laplace and Poisson equations, boundary value problems; Magnetostatics: Biot-Savart law, Ampere's theorem, electromagnetic induction; Maxwell's equations in free space and linear isotropic media; boundary conditions on fields at interfaces; Scalar and vector potentials; Gauge invariance; Electromagnetic waves in free space, dielectrics, and conductors; Reflection and refraction, polarization, Fresnel's Law; Dispersion relations in plasma; Transmission lines and wave guides; Dynamics of charged particles in static and uniform electromagnetic fields; Radiation from moving charges, dipoles and retarded potentials.

Quantum Mechanics

Wave-particle duality; Wave functions in coordinate and momentum representations; Commutators and Heisenberg's uncertainty principle; Matrix representation; Dirac's bra and ket notation; Schroedinger equation (time-dependent and time-independent); Eigenvalue problems such as particle-in-a-box, harmonic oscillator, etc.; Tunneling through a barrier; Motion in a central potential; Orbital angular momentum, Angular momentum algebra, spin; Addition of angular momenta; Hydrogen atom, spin-orbit coupling, fine structure; Time-independent perturbation theory and applications; Variational method; WKB approximation; Time dependent perturbation theory and Fermi's Golden Rule; Selection rules; Semi-classical theory of radiation; Elementary theory of scattering, phase shifts, partial waves, Born approximation; Identical particles, Pauli's exclusion principle, spin-statistics connection; Relativistic quantum mechanics: Klein Gordon and Dirac equations.

UNIT-III

Statistical Mechanics

Laws of thermodynamics and their consequences; Thermodynamic potentials, Maxwell relations; Chemical potential, phase equilibria; Phase space, micro- and macrostates; Microcanonical, canonical and grand-canonical ensembles and partition functions; Free Energy and connection with thermodynamic quantities; First- and second-order phase transitions; Classical and quantum statistics, ideal Fermi and Bose gases; Principle of detailed balance; Blackbody radiation and Planck's distribution law; Bose-Einstein condensation.

UNIT-IV

Experimental Techniques and data analysis

Data interpretation and analysis; Precision and accuracy, error analysis, propagation of errors, least squares fitting, linear and nonlinear curve fitting, chi-square test; Transducers (temperature, pressure/vacuum, magnetic field, vibration, optical, and particle detectors), measurement and control; Signal conditioning and recovery, impedance matching, amplification (Op-amp based instrumentation amp, feedback); Hall effect, four probe and Vander-Paw methods; X-ray diffraction technique.

Applications of the above experimental and analytical techniques to typical undergraduate and graduate level laboratory experiments.

Electronics

Semiconductor diodes, transistors, CE, CB and CC amplifiers, FET & MOSFET characteristics, Frequency effects and applications; OP-AMP theory, Negative feedback, Linear and non-linear OP-AMP circuits, Oscillators and timers, Thyristers; Logic gates, HA, FA.

Atomic & Molecular Physics

Quantum states of an electron in an atom; Electron spin; Stern-Gerlach experiment; Spectrum of Hydrogen, helium and alkali atoms; Relativistic corrections for energy levels of hydrogen; Hyperfine structure and isotopic shift; width of spectral lines; LS & JJ coupling; Zeeman, Paschen Back & Stark effect; X-ray spectroscopy; Electron spin resonance, Nuclear magnetic resonance, chemical shift; Rotational, vibrational, electronic, and Raman spectra of diatomic molecules; Frank – Condon principle and selection rules; Spontaneous and stimulated emission, Einstein A & B coefficients; Lasers, optical pumping, population inversion, rate equation.

UNIT-V Condensed Matter Physics

Bravais lattices; Reciprocal lattice, diffraction and the structure factor; Bonding of solids; Elastic properties, phonons, lattice specific heat; Free electron theory and electronic specific heat; Response and relaxation phenomena; Drude model of electrical and thermal conductivity; Hall effect and thermoelectric power; Diamagnetism, paramagnetism, and ferromagnetism; Electron motion in a periodic potential, band theory of metals, insulators and semiconductors; Superconductivity, type – I and type - II superconductors, Josephson junctions; Defects and dislocations; Ordered phases of matter, translational and orientational order, kinds of liquid crystalline order.

Nuclear and Particle Physics

Basic nuclear properties: size, shape, charge distribution, spin and parity; Binding energy, semi-empirical mass formula; Liquid drop model; Fission and fusion; Nature of the nuclear force, form of nucleon-nucleon potential; Charge-independence and charge-symmetry of nuclear forces; Isospin; Deuteron problem; Evidence of shell structure, single- particle shell model, its validity and limitations; Rotational spectra; Elementary ideas of alpha, beta and gamma decays and their selection rules; Nuclear reactions, reaction mechanisms, compound nuclei and direct reactions; Classification of fundamental forces; Elementary particles (quarks, baryons, mesons, leptons); Spin and parity assignments, isospin, strangeness; C, P, and T invariance and applications of symmetry arguments to particle reactions, parity non-conservation in weak interaction.

APPLIED SCIENCE (CHEMISTRY)

(Code No. GKV-120)

Note:

(i) Paper setter shall set 50 questions from the syllabus and each question shall carry one mark.

(ii) Normally ten questions should be set from each unit of the prescribed syllabus for RET.

UNIT- I

Coordination Chemistry: Molecular orbital theory as applied to octahedral complexes, pi - bonding in octahedral complexes; cis and trans isomerism in square planar and octahedral complexes. Term symbols S,P,D,F, in a cubic field; splitting of term for d configuration; spectra of Transition metal complexes, selection rules and intensities of the transitions, nature of Electronic transitions in complexes, Calculation of Dq, B' and beta for Cr (III) and Ni (II) complexes. Structural Evidence from Electronic spectra, charge-transfer spectra.

Bioinorganic Chemistry General introduction to Bio-inorganic Chemistry; occurrence of Inorganic elements in organisms, classification of metallo bio-molecules; Biologically important features and functions of inorganic elements, Biologically important ligands for metal ions, co-ordination by proteins and Enzymatic catalysis.

(a) Role of metal ions (An overview) in Biological systems Na, K, Ca, Mg & Zn (Giving suitable examples) Biomineralisation.

(b) Role of non-metals in Biological systems, viz; Cl, B, Si, As, Br, F, I, Se (Giving suitable examples)

UNIT- II

Electromagnetic spectrum, Electronic band spectra (UV and Vis region), Lambert's law, Beer's law, Beer's-Lambert law, Extinction coefficient, idea of Bathochromic and Hypsochromic shifts, Hyperchromic and Hypochromic effects, Instrumentation, Simple and general applications of UV-Vis spectroscopy to organic compounds. Vibrational rotational spectra- Principle, absorption of infrared radiation & molecular vibration. Fundamental vibrations and overtones. Infrared vibration - active and forbidden (Selection rules). Instrumentation, simple and general applications of I. R. spectroscopy. Atomic Absorption spectroscopy, flame photometric methods of estimation of alkali and alkaline metals.

NMR Spectroscopy: Basic concept, Low resolution & high resolution nmr; chemical shift, coupling constant, shielding & deshielding, Simple application of pmr. E.S.R. spectra of transition metal complexes, spin Hamiltonian, Instrumentation and application of E.S.R. and NMR spectroscopy. Mass spectroscopy: Basic idea, Principle of operation of mass spectrometer, Instrumentation, fragmentation pattern of major functional groups, simple general applications.

UNIT- III

Treatment of Data in Quantitative Analysis: Accuracy, Precision, Standard deviation, Types of errors, Elimination of errors, Significant figures, Rejection quotient test. Polarisation, Overvoltage, Theories of Hydrogen overvoltage, Ilkovic equation, d.m.e., Half wave potential, Diffusion current, Polarography and its simple and general applications (Specific applications not required). Ion Exchange: Cation and Anion exchangers, their Stability, Selectivity and Characteristics. General applications including ion exchange chromatography.

Theory, technique and applications of Conductometric, Potentiometric and pH- metric titrations.

Solvent Extraction: Principles, Techniques and applications. Chromatographic techniques: Basic principles, experimental techniques, and simple and general applications of Column, Paper, Thin layer, Gas-solid, Gas- liquid and High-Performance Liquid Chromatography.

UNIT- IV

Physico-chemical analysis of water samples for turbidity, conductivity, total solids, filterable, nonfilterable, fixed and volatile solids, pH, total carbonate, bicarbonate and total alkalinity, B.O.D., C.O.D., D.O., NH_3, NO_3, NO_2, organic N_2, total N_2, Inorganic phosphates, silica, SO_4 - -, Hardness (Ca and Mg), Na, K, residual Chlorine; Optimum alum dose. Treatment and analysis of soil samples for porous nature, water absorbing capacity, loss on ignition, pH, conductance, cation

exchange capacity, chlorides, sulphates, soluble carbonates and bicarbonates, total organic matter, available phosphorus, available nitrogen, nitrogen by Kjeldahl's method, exchangeable Na and K.

Oils and Fats: General idea, Classification, Occurrence, Basic idea of the function of oils and fats, Physical and chemical properties of oils and fats, Applications of oils and fats. Analysis of oils and fats: Determination of physical constants like M.P. and B.P., Specific gravity, Refractive index, Total volatile matter, Determination of Acid value, Iodine value, R.M. value, Polenske number.

Soaps and detergents: Idea of common soaps, Cleansing action of soaps, Varities of soaps and their uses, Idea of detergents, Hazards of soaps and detergents. Analysis of soaps and detergents: Determination of Matter insoluble in alcohol, Free alkali and free acids, Matter insoluble in water, Glycerol content (Dichromate method), Foaming capacity and its comparison in different samples of soaps and detergents, Effect of sodium carbonate on the foaming capacity of soap.

UNIT- V

Chemical Kinetics: Derivation of IIIrd order kinetic equation, collision theory for uni, bi and termolecular reactions, Steric factor, Theory of absolute reaction rates, Entropy of activation. Experimental techniques for the study of kinetics of slow and fast reactions. Potential energy surfaces (two-dimentional and three-dimentional diagrams), P.E. surface for $H + H_2$ reaction, Concept of COL and Contour diagram. Opposing, Consecutive, Side and Induced reactions, Induction period. Chain reactions and explosion limits. Reactions in solution, Factors affecting the rates in solutions, effect of solvation and Internal pressures, Double and Single sphere models, Effect of ionic strength, Bronsted-Bjerrum equation.

Macromolecules: Addition and condensation polymerisation. Degree of polymerisation and length of polymer chains. Requirement of purity for synthesis. Molecular weights and their distribution. Polydispersity. Determination of molecular weight by Osmotic pressure, Viscosity, light scattering and sedimentation equilibrium methods.

Free radical vinyl polymerization, ionic vinyl polymerization, Ziegler-Natta polymerization and vinyl polymers. Polyesters, polyamides, phenol formaldehyde resins, urea formaldehyde resins, epoxy resins and polyurethanes. Natural and synthetic rubbers.

APPLIED SCIENCE (MATHMATICS)

(Code No. GKV - 121)

Note :

(i) Paper setter shall set 50 questions from the syllabus and each question shall carry one mark.

(ii) Normally ten questions should be set from each unit of the prescribed syllabus for RET.

UNIT – I Real Analysis and Complex Analysis

Countable and uncountable sets, Real number system as a complete ordered field, Archimedean property, supremum, infimum, Sequence, convergence, Cauchy convergence criterion for Sequence, limsup, liminf, Bolzano-Weierstrass theorem. Infinite series, Cauchy convergence criterion for series, positive term series, convergence of p-series, tests of convergence of series, alternating series, Leibnitz's test. Definition and examples of absolute and conditional convergence.

Sequences and series of functions, pointwise and uniform convergence, M_n-test, M-test, Continuity, uniform continuity, types of discontinuity, integrability and differentiability of functions, mean value theorem, power series and radius of convergence.

Metric spaces: Open and closed set, continuity, connectedness, complete metric space, Cantor's intersection theorem, compact metric space.

Normed linear spaces, spaces of continuous functions and related examples.

Analytic functions, Cauchy-Riemann equations, Contour integral, Cauchy's theorem, Cauchy's integral formula, Liouville's theorem, maximum modulus principle, Schwartz lemma, Open mapping theorem, Taylor series, Laurent series, calculus of residues.

UNIT– II Algebra

Vector spaces, subspaces, linear dependence, basis, dimension, algebra of linear transformations, algebra of matrices, rank and determinant of matrices, linear equations, eigenvalues and eigenvectors, Cayley-Hamilton theorem, matrix representation of linear transformations, change of basis, canonical forms, diagonal forms, triangular forms, Jordan forms, inner product spaces, orthonormal basis, quadratic forms.

Groups, subgroups, Lagrange's Theorem, normal subgroups, quotient groups, homomorphisms, isomorphisms, cyclic groups, permutations groups, Cayley's theorem, class equations, Cauchy theorem, Sylow's theorems, Rings, ideals, prime and maximal ideals, quotient rings, polynomial rings, integral domains, fields.

UNIT – III Differential Equations

Existence and uniqueness of solutions of initial value problems for first order ordinary differential equations, singular solutions of first order ODEs, system of first order ODEs, general theory of homogenous and non-homogeneous linear ODEs, variation of parameters, Sturm-Liouville boundary value problem.

Lagrange and Charpit methods for solving first order PDEs, Cauchy problem for first order PDEs, and classification of second order linear PDEs, method of separation of variables of Laplace equation.

UNIT – IV Numerical Analysis

Errors, Numerical solutions of algebraic equations, regula-falsi method, secant method, method of iteration and Newton-Raphson method, rate of convergence, solution of systems of linear algebraic equations using Gauss elimination and Gauss-Seidel methods, finite differences, Interpolation for evenly spaced and unevenly spaced points.

Numerical differentiation and integration, numerical solution of ODEs using Picard, Euler, modified Euler and Runge-Kutta methods.

UNIT – V Operation Research and Statistics

Linear programming problem, Graphical method, Convex Sets, simplex method, optimality and unboundedness, introduction to artificial variables, two-phase method, Big-M method and their comparison. Duality, formulation of the dual problem, primal-dual relationships.

Transportation problem: Northwest-corner method, least cost method and Vogel approximation method for determination of starting basic solution of transportation problem, Assignment problem: Hungarian method for solving assignment problem. Game theory: Solving two person zero sum games, games with mixed strategies, graphical solution procedure.

Convex functions, K-T conditions, quadratic programming.

Sample space, discrete probability, independent events, Bayes' Theorem, random variables and distribution functions, expectation and moments, independent random variables, Standard discrete and continuous univariate distributions, Poisson, Binomial and Normal distributions. Curve fitting, regression and correlation.

COMPUTER SCIENCE & ENGINEERING

(Code No. GKV - 122)

Note :

(i) Paper setter shall set 50 questions from the syllabus and each question shall carry one mark.

(ii) Normally ten questions should be set from each unit of the prescribed syllabus for RET.

Unit-I (Algorithm Design and Analysis)

Elementary data structures; Divide and conquer method: Binary search, Finding maximum and minimum, Merge sort; Greedy method: Knapsack problem, Job sequencing with deadlines, Optimal merge patterns; Dynamic programming: Multistage graphs, Optimal binary search trees, 0/1 Knapsack, Reliability design, Traveling salesperson problem; Backtracking:

8- queens problem, Sum of subsets, Hamiltonian cycles, Knapsack problem; Basic search and traversal techniques: techniques, Code optimization, Bi-connected components and Depth- first search; Non--deterministic algorithm: Non-deterministic programming constructs, Simple non-deterministic programs; NP-hard and NP-complete problems.

Unit-II (Computer Networks)

Analog and digital signals, Periodic analog signals, Transmission impairment, Data rate limits, Performance. Digital transmission: Analog to digital conversion, Transmission modes. Analog transmission: Digital to analog conversion, Analog to analog conversion. Bandwidth utilization: Multiplexing and spreading. Transmission media: Guided and unguided. Dial-up modems and ADSL. Types of error, Redundancy, Forward error correction and retransmission, Hamming distance, CRC, Polynomials, Checksum. Data link control: Framing, Flow and error control, Simplest protocol, Stop-and-wait protocol, Stop-and-wait ARQ, Go-back-n ARQ, Selective repeat ARQ, Piggybacking. Multiple access: CSMA, CSMA/ CD, CSMA/ CA. Standard ethernet.Bridges: Requirement, Transparent bridge, Source routing bridge. IEEE 802.11. Switching: Circuit- switched networks, Datagram networks, Virtual-circuit networks. Internet protocol version 4, Address mapping, Delivery, Forwarding and routing of IP packets. Unicast routing protocols: Distance routing protocol, Link state routing.

Unit-III (Software Engineering)

SDLC models, Selection of a life cycle model; Software requirements analysis and specifications: Requirements engineering, Requirements elicitation, Requirements analysis, Requirements documentation; Software project planning: Size estimation, Cost estimation, models, Constructive cost model, Software risk management; Software design: Design definition, Modularity, Strategy of design, Function oriented deign, IEEE recommended practice for software design description, Object oriented design; Software metrics: Software metrics, Token count, Data structure metrics, Information flow metrics, Metrics analysis; Software reliability: Basic concepts, Software quality, Software reliability models, Capability maturity model; Software testing: Testing process, Functional testing, Structural testing, Levels of testing, Debugging, Testing tools; Software maintenance: Maintenance process, Maintenance models, Estimation of maintenance costs, Regression testing, Reverse engineering, Software re-engineering, Configuration management.

Unit-IV (Operations Research)

Linear programming, Simplex method, Standard LP form and its basic solutions, Simplex algorithm; Duality: dual problems, Relationship between the optimal primal and dual solutions, Dual simplex method, Primal dual computation; Transportation and assignment model: Transportation model, Non- traditional transportation model, Transportation algorithms, Assignments model; Deterministic dynamic programming: Recursive nature of computing, Forward and backward recursion; Queuing theory: Queuing system, Characteristics of queuing models, Transient and steady state of queuing system, Birth- death process, Pure birth & pure death processes, (M/M/1) : (FCFS/

∞/∞), (M/M/1) : (FCFS/N/∞), (M/M/S) : (FCFS/∞/∞) and (M/M/S) : (FCFS/N/∞) Models.

Unit-V (Current Trends and Technologies)

Mobile computing : Mobile connectivity, Cells, Framework, Wireless delivery technology and switching methods, Mobile information access devices, Mobile data internetworking standards, Cellular data communication protocols, Mobile computing applications; Mobile databases - protocols, Scope, Tools and technology.

Security and Cryptography: Introduction to security, Security attacks, Services and mechanisms, Data encryption standard, Advanced encryption standard, Public- key cryptography and RSA, Message authentication and Hash functions, Hash and MAC algorithms, Digital signatures and authentication protocols; Network security : Authentication applications, Electronic mail security, IP security, Web security, Intruders, Malicious software, Firewalls.

ELECTRONICS & COMMUNICATION ENGG.

(Code No. GKV - 123)

Note :

(i) Paper setter shall set 50 questions from the syllabus and each question shall carry one mark.

(ii) Normally ten questions should be set from each unit of the prescribed syllabus for RET.

UNIT -I

Network Theorems: superposition, Thevenin and Norton's Maximum Power Transfer, Fourier series. time domain analysis of simple RLC circuits. Laplace and Z transforms; frequency domain analysis of RLC circuits. Two port network parameters.

UNIT -II

Analog Circuits: Characteristics and equivalent circuits (large and small signal) of diodes, BJTs, JFETs and MOSFETs Simple diode circuits: clipping, clamping, rectifier Biasing and bias stability of transistor and FET amplifiers.

Amplifiers: Single and multistage, Differential, Operational; feedback and power. Analysis of amplifiers; Simple op-amp circuits. Filters, oscillators.

UNIT -III

Microprocessors: Evolution, microcomputer architecture; Intel 8085: architecture, addressing mode, Instruction set, Programming technique, Interrupt Structure; Intel 8086: architecture, concept of segmented memory, Addressing modes, Instruction set, Programming techniques, Interrupt Structure;

Digital Circuits: Boolean algebra; minimization of Boolean functions; logic gates, Digital IC families (DTL, TTL, ECL, MOS, CMOS). Combinational circuits; arithmetic circuits, Code converters, Multiplexers and decoders. Sequential circuits; Latches and flip-flops, Counters and shift registers.

UNIT -IV

Electromagnetism: Gradient, Divergence and curl; Gauss' and Stroke' theorems, Maxwell's equations: differential and integral forms. Wave equation. Pointing vector. Transmission lines: Characteristics impedance;

Communication System: Analog and Digital Communication systems. AM, FM, PM modulation and demodulation. Fourier analysis of signals amplitude, Phase and power spectrum, Autocorrelation and cross-correlation and their Fourier transform. Super-heterodyne receivers. Sampling theorem. Pulse code modulation (PCM), delta modulation (DM). Digital modulation techniques (ASK, PSK, FSK, QAM). Matched filter and probability of error.

UNIT-V

Waveguides: Modes in rectangular waveguides; Boundary conditions; Cut-Off frequencies; Dispersion relations.

Antennas: Dipole antennas; Antenna arrays; Radiation pattern; Reciprocity theorem; Antenna gain.

PHARMACEUTICAL SCIENCES

(Code No. GKV - 124)

Note :

(i) Paper setter shall set 50 questions from the syllabus and each question shall carry one mark.

(ii) Normally ten questions should be set from each unit of the prescribed syllabus for RET.

UNIT -I

Natural Products: Pharmacognosy & Phytochemistry - Chemistry, tests, isolation, characterization and estimation of phytopharmaceuticals belonging to the group of Alkaloids, Glycosides, Terpenoids, Steroids, Bioflavanoids, Purines, Guggul lipids. Pharmacognosy of crude drugs that contain the above constituents. Standardization of raw materials and herbal products. WHO guidelines. Quantitative microscopy including modern techniques used for evaluation. Biotechnological principles and techniques for plant development, Tissue culture.

Unit-II

Pharmacology: General pharmacological principles including Toxicology. Drug interaction. Pharmacology of drugs acting on Central nervous system, Cardiovascular system, Autonomic nervous system, Gastro intestinal system and Respiratory

system. Pharmacology of Autocoids, Hormones, Hormone antagonists, chemotherapeutic agents including anticancer drugs. Bioassays, Immuno Pharmacology. Drugs acting on the blood & blood forming organs. Drugs acting on the renal system.

Clinical Pharmacy: Therapeutic Drug Monitoring Dosage regimen in Pregnancy and Lactation, Paediatrics and Geriatrics. Renal and hepatic impairment. Drug - Drug interactions and Drug - food interactions, Adverse Drug reactions. Medication History, interview and Patient counselling.

Unit-III

Medicinal Chemistry: Structure, nomenclature, classification, synthesis, SAR and metabolism of the following category of drugs, which are official in Indian Pharmacopoeia and British Pharmacopoeia. Introduction to drug design. Stereochemistry of drug molecules. Hypnotics and Sedatives, Analgesics, NSAIDS, Neuroleptics, Antidepressants, Anxiolytics, Anticonvulsants, Antihistaminics, Local Anaesthetics, Cardio Vascular drugs - Antianginal agents Vasodilators, Adrenergic & Cholinergic drugs, Cardiotonic agents, Diuretics, Antiypertensive drugs, Hypoglycemic agents, Antilipedmic agents, Coagulants, Anticoagulants, Antiplatelet agents. Chemotherapeutic agents-Antibiotics, Antibacterials, Sulphadrugs. Antiprotozoal drugs, Antiviral, Antitubercular, Antimalarial, Anticancer, Antiamoebic drugs. Diagnostic agents.Preparation and storage and uses of official Radiopharmaceuticals, Vitamins and Hormones.Eicosanoids and their application.

Unit-IV

Pharmaceutics: Development, manufacturing standards Q.C. limits, labeling, as per the pharmacopoeal requirements. Storage, manufacturing and characterization of different dosage forms and novel drug delivery systems. Biopharmaceutics and Pharmacokinetics and their importance in formulation. Formulation and preparation of cosmetics - lipstick, shampoo, creams, nail preparations and dentifrices. Pharmaceutical calculations.

Pharmaceutical Jurisprudence: Drugs and cosmetics Act and rules with respect to manufacture, sales and storage. Pharmacy Act. Pharmaceutical ethics, Patent Act, Copyright Act

Microbiology: Principles and methods of microbiological assays of the Pharmacopoeia. Methods of preparation of official sera and vaccines. Serological and diagnostics tests. Applications of microorganisms in Bio Conversions and in Pharmaceutical industry.

Unit-V

Biochemistry: Biochemical role of hormones, Vitamins, Enzymes, Nucleic acids, Bioenergetics. General principles of immunology. Immunological. Metabolism of carbohydrate, lipids, proteins. Methods to determine, kidney & liver function. Lipid profiles.

Pharmaceutical Analysis: Principles, instrumentation and applications of the following: Absorption spectroscopy (UV, visible & IR). Fluorimetry, Flame photometry, Potentiometry. Conductometry and Polarography. Pharmacopoeial assays. Principles of NMR, ESR, Mass spectroscopy.X-ray diffraction analysis and different chromatographic methods.

ECONOMICS

UNIT - I **Micro-Economic:** Demand and Supply, Consumer behavior under conditions of uncertainty, Theory of Production and Costs, Market Structure : Perfect Competition, Monopoly, Monopolistic Competition, Oligopolies. Factor Pricing Analysis. Indifference curve analysis. **Macro-Economics :** National Income : Concepts and Measurement, Inflation and Phillips Curve Analysis, IS-LM Model Approach. Concept of investment multiplier, Theories of investment and accelerator.

UNIT - II **International Economics and Public Finance :** Theory of International Trade, Exchange Rate, Theory and Concept, Gain from Trade, Terms of Trade, Trade Barriers, GATT, WTO, IMF and Word Bank, Role of the Government in Economic activity - Allocation, distribution and stablization functions, The Public Budgets - Kinds of Budgets, difference concepts of budget deficits; Budgets of the Union Government in India. Public expenditure, Public Dept and its management, GST. Public Revenue. Cost Benefit Analysis.

UNIT - III **Growth and Development :** Economic Growth and Economic Development, Theories of Economic Development : Adam Smith, Ricarodo, Marx, Schumpeter, Rostow, Balanced and Unbalanced growth, Big Pushapproach. Model of Economic Growth : Harrod-Domar, Solow. Indicators of Economic Development : Physical Quality of Life Index (PQLI), Human Development Index (HDI), Gender Development Indices (GDI).

UNIT - IV **Environmental Economics and Demography :** Environment and Public Goods, Role of state in environmental progress, Valuation of Environmental Goods, Concepts and Measures : Fertility, Morbidity, Mortality, Migration, Age Structure, Demographic Dividend. Agriculture Economics, Role of Agriculture in Indian Economy, Interrelationship between agriculture and industry. Agriculture Pattern and Structure of Growth, Major Challenges, Industry Pattern and Structure of Growth, Major Challenges, Rural and Urban Development - Issue and Challenges.

UNIT - V **Indian Economy :** Meaning, Nature, Structure and Characteristics; Foreign Direct Investment (FDI), Multinational Corporation (MNCs), Foreign Exchange Regulatory Act (FERA), Centre-State Financial Relationship; National Institution of Transforming India (NITI Aayog), National Development Council (NDC), Developing Grass Root Organization for Development : Panchayatiraj; Montary and Fiscal Policy. Economy of Uttarakhand.