

**ARABIC MADRASAH (H/PG)**

**SUBJECT CODE – 01**

There shall be a paper of 60 marks. The syllabus, Distribution of marks and the pattern of questions shall be as follows:

1. Three questions each having two marks.  
Translation /Explanation of an extract into Bengali or vowel signs from the following Hadith Sharif.  
(a) Mishkat al-Masabih : Kitabul Iman, Ilim ,Kitab al-Salat, Kitabul –Janaiz & Kitabul Buyou only.  
(b) Sahihul-Bukhari (Kitabul Magazi only)  
(c) Sahih -Muslim ( Kitabul-birr was silah only)
2. Three questions each having two marks.  
Explanation / Translation of the different verses of the Holy Quran into Bengali or vowel signs from the following commentaries:  
Tafsir-e-Jalalain (Sura-e-araf, Anfal and Nahl)
3. Three questions each having two marks.  
Usual al-Tafsir, Hadith and Fiqh.  
(a) Second half of Al-Fauzul Kabir by Shah Waliullah.  
(b) Sharhu Nukhbat al-Fikr.  
(c) Musallam al-Thubut : from beginning to II Maqala.
4. Three questions each having two marks.  
Fiqh :  
Al-Hidaya : Kitab al-Riba. Rihaan and Wasaya only.
5. Two questions from Kalam each having two marks.  
Ilmul Kalam  
(a) Second Half of Sharhu Aqaid Nasafi.
6. One question from each of History of Hadith, Tafsir, Fiqh and Islam (Total four question ) each having two marks.  
(a) History of Tafsir 4<sup>th</sup> Century A.H. only  
(b) History of Hadith 5<sup>th</sup> Century A.H. only.  
(c) History of Fiqh 4<sup>th</sup> Century A.H. only  
(d) History of Islam Khulafa e-Rashidin to Khulafa-e Bani Umayyah.
7. Translation / Explanation of an extract or vowel signs from the followings :

B.A. Pass Arabic Selection Prose Part-II 1963 edition. And Arabic Hons. Course Published by C.U. 1976. Four questions each having two marks.

- (a) Al-Iqab
- (b) Al-Nahdat al-Lughat at-Arabiyyah
- (c) Al- Ayyam
- (d) Maqamat Al- Hariri -- 1 to 2 Chapters.

8. Explanation / Translation of Different verses or vowel signs from the following poetry :

B.A. Pass Arabic Selection Poetry Part-II. Four question each having two marks.

University Arabic Selection 1976.

- |   |       |     |   |     |
|---|-------|-----|---|-----|
| (a) Diwan-Al-Zuhair                       | Pages | 141 | - | 143 |
| (b) Diwan Al-Mutanabbi : Qasidah Lamiya   | Pages | 139 | - | 146 |
| (c) Hafiz Ibrahim                         | Pages | 231 | - | 245 |
| (d) Al-Shawqiyat : Al Hilal, Ayyuhan Nil. |       |     |   |     |

9. **Grammar.** There will be four questions each having two marks

- (a) Nouns and cases of nouns
- (b) Number Singular & Plural
- (c) **Syntax** : (I) Different kinds of sentences (II) Grammatical Analysis of any sentence or verse with vowel signs. (III) Mafail Khamsa, Hal, Tamiz, Huraf –e Mushabbah bil Fe'l etc.
- (d) (I) Ilmul Bayan, Ilmul badi, Mukhtasarul Ma'ami by Taftazani (1<sup>st</sup> half)
- (e) History of Arabic Literature from Pre-Islamic period to upto 1990 A.D. on the different aspects of life and works of the famous scholars, writers and poets etc.

## ARABIC (HONS/PG) (H.S)[ CODE -02]

*There shall be a paper of 60 marks. The Syllabus, distribution of marks and the pattern of questions shall be as follows:*

1. Translation / Explanation of an extract into English or vowel signs from the following B.A. Pass Arabic Selection Prose Part-II 1963 edition. And Arabic Hons. Course Published by C.U. 1976. Eight questions each having two marks.

(a) Al-Muntakhabatu Minal-Kashshaf	Pages	26	-	39
(b) Al-Muntakhabatu FiSirah	Pages	47	-	67
(c) Al-Muntakhabatu Min Muqaddamah	Pages	68	-	84
(d) Al-Iqab	Pages	175	-	20
(e) Al-Nahdataal-Lughatat-Arabiyya	Pages	299		33
(f) Ala Hamish al-Sirah Book-I by Dr. T. Hossain				
(g) Al-Ayyam - do.				
(h) Maqamat Al-Hariri ----- Introduction & 1 to 3 Chapters				
(i) Ki-Tab Al-Fakhri upto IInd Chapter from beginning				
  
2. Explanation /Translation of Different verses or vowel signs from the following poetry B.A. Pass Arabic Selection Poetry Part-II. Eight question each having two marks. University Arabic Selection 1976.

(a) Diwan-Al-Zuhair	Pages	141	-	14
(b) Al-Mutanabbi: Qasidah Lamiya	Pages	139	-	14
(c) Abul Ala al-Maarri	Pages	168	-	18
(d) Al-Muntakhabatu Min Diwani Ibnil Farid (Arabic Hons. Course Pub. by C.U. 1976)	Pages	120	-	12
(e) Hafiz Ibrahim	Pages	231		24
(f) Jamil Sidqi Al-Zahawi	Pages	286	-	30
(g) Al-Shawqiyat: Al Hilal, Ayyuhan Nil, Al-Dimashq, Munajatul Ahram, Al-Riqqu Wal-hurriyyaat, Masair-al-Ayyam, Dhikra Istibal al-Suriya & Tut. Ankh Amun				
  
3. **Grammar.** There will be six questions each having two marks
  - (a) Etymology : (I) Verbs their measures and salient features  
(II) Irregular verbs includes perfect (Sahih)  
Hamzated (Mahmuz) Infirm (Mutal) Surb (Mudhaaf)
  - (b) Nouns and cases of nouns
  - (c) Number Singular & Plural
  - (d) Different kinds of Particles (Al-Huraf)
  - (e) Syntex: Different kinds of sentences (II) Grammatical Analysis of any sentence or verse with vowel signs. (III) Mafail Khamsa, Hal, Tamiz, Mushabbah bil Fil etc.

- (f) Powers (Al-Awamil al-Samaiyya)
  - (g) Rhetoric & Prosody
    - I. Ilmu Bayan, Ilmu badi
    - II. Al Magta, Al-Akran, Al-Ilalat, Al-Bahr and Al-Taqti.
  - (h) Philology: A short answer type question on Semitic Languages.
4. History of Arabic Literature from Pre-Islamic period to upto 1990 A.D. on the different aspects of life and works of the famous scholars, writers and poets etc. (b) Arabic Literacy Criticism especially on Pre-Islamic and Abbasid Poetry, Critics and poets etc. There will be 8 (eight) questions each having two marks.

ADVANCED ARABIC (ISLAM PARICHAY)/THEOLOGY (H/PG)

CODE - 03

There shall be a paper of 60 marks. The syllabus, Distribution of marks and the pattern of questions shall be as follows:

1. **Four** questions each having two marks:  
Translation/Explanation of an extract into Bengali or vowel signs from the following Hadith Sharif.  
(a) Mishkat al-Masabih : Kitab al-Iman, Kitab al-Salat, Kitabul-Janaiz & Kitabul Buyou only, (b) Sahih al-Bukhari. (Vol-II only) (c) Sahih al-Muslim (Vol-I only), (d) Abu Daud Sharif (Vol. II only)
2. **Four** questions each having two marks.  
Explanation/Translation of the different verses of the Holy Quran into Bengali or vowel signs from the following commentaries:  
Tafsir-e-Jalalain (Sura-e-araf, Anfal and Nahl)
3. **Three** questions each having two marks.  
Usual al-Tafsir, Hadith and Fiqh.  
(a) Second half of Al-Fauzul Kabir by Shah Waliullah. (b) Sharhu Nukhbat al-Fikr (c) Musallam al-Thubut : from beginning to II Maqala.
4. **Four** questions each having two marks.  
Fiqh :  
Al-Hidaya : Kitab al-Riba. Rihan and Wasaya only.
5. **One** question from Kalam, **One** question from Balagat and **one** question from Mantique/  
Hikmat each having two marks.  
Ilmul Kalam, Balagat, Mantique & Hikmat :  
(a) Second Half of Sharhu Aqaid Nasafi. (b) Sharhu al-Tahzib (Tasawoorat.) (c) Hidayat al-Hikmat (Ilahiyyat.)  
(d) Mukhtasar al-miani: from Musnad to Al-Maani.
6. **Four** questions each having two marks.  
Arabic Literature:  
(a) Prose (I) Maqamat: Forth Chapter. (II) Al-Ayyam upto 78 page from begining. Vol. 1  
(b) Poetry (I) Muallaqa-e-Labid and Amr. bin Kulthum. (II) Diwan-e-Hafiz ; Itezar Ila Ahmad Shawqi and Ratha Al-Ustad Mohammad Abduh. (III) Jamil Sidqi Al-Zahawi: Ila Ahlil-Haq. (IV) Muqaddama Ibn-e-Khadun : Fi Ulum al-Lisan al-Arabiyya to End.
7. **Two** questions from each of History of Hadith, Tafsir & Fiqh & **one** question from each of History of Arabic literature & Islamic History each having two marks. (Total eight questions)  
History of Tafsir, Hadith, Fiqh, Arabic literature and Islam:  
(a) History of Tafsir 4th Century A. H. only, (b) History of Hadith 5th Century A.H. Only (c) History of Fiqh 4th Century A.H. only (d) Hsitory of Arabic Literature 10th & 1st half of 11th Century A.D. including Egypt and Spain (e) History of Islam Khulafa- e-Rashidin to Banu Umayyah.

## [Follow New Syllabus]

### ১। পাঠ্যপুস্তক (TEXT) নির্ভর প্রশ্ন :

[পশ্চিমবঙ্গ মধ্য শিক্ষা পর্ষৎ-প্রকাশিত 'পাঠসংকলন' (সর্বশেষ সংস্করণ) এবং উচ্চ মাধ্যমিক শিক্ষা সংসদ প্রকাশিত বাংলা 'ক' ভাষার দুটি সংকলন : (১) গদ্য (২) কবিতা ও নাটক অবলম্বনে প্রশ্ন রচিত হবে।]

#### (ক) প্রশ্নের বিষয় :

রচয়িতার পরিচয়, বিষয়বস্তু, রসবৈশিষ্ট্য নির্দেশ, আখ্যান নির্ভর রচনার ক্ষেত্রে পূর্বোক্ত বিষয়গুলিসহ চরিত্রবৈশিষ্ট্য নির্ধারণ।

#### (খ) উদ্ভূত অংশের ভিত্তিতে বিশেষ টীকা/ব্যাখ্যা/ভাষাগত প্রশ্ন।

### ২। সাহিত্যের ইতিহাস :

#### (ক) প্রাচীন ও মধ্যযুগ (দশম—অষ্টাদশ শতক)

(i) প্রাচীন ও মধ্যযুগের প্রধান প্রধান ঐতিহাসিক ঘটনা এবং ওই পর্বের সাহিত্যবিকাশে ওইসব ঘটনার প্রভাব।

(ii) কাব্যের আবির্ভাব ও প্রকাশকাল; কাব্যধারার প্রধান প্রধান কবির পরিচয়; কাব্যের বিষয়বস্তু ও বৈশিষ্ট্য; ঐতিহাসিক গুরুত্ব।

[বিষয় : চর্যাপদ; শ্রীকৃষ্ণকীর্তন; মঙ্গলকাব্য; অনুবাদ কাব্য; বৈয়ব পদাবলি; চৈতন্যজীবনীকাব্য; আরাকান রাজসভার আনুকূল্যে রচিত কাব্য; শাস্ত্র পদাবলি; ময়মনসিংহ গীতিকা; বাউল গান]

#### (খ) আধুনিক যুগ (উনবিংশ—বিংশ শতক)

(i) আধুনিক যুগ পর্বের প্রধান প্রধান ঐতিহাসিক ঘটনা এবং এই পর্বের সাহিত্যবিকাশে তার প্রভাব।

(ii) রচয়িতার জীবৎকাল বিশিষ্টতা; রচনা ও গ্রন্থের নাম, প্রথম প্রকাশকাল, বিষয়বস্তু, আখ্যাননির্ভর রচনার ক্ষেত্রে : চরিত্র; সাময়িক পত্রের ক্ষেত্রে : প্রথম প্রকাশকাল, ঐতিহাসিক গুরুত্ব, সম্পাদকের নাম।

[বিষয় : গদ্য/প্রবন্ধ সাহিত্য, সাময়িক পত্র (দিগদর্শন থেকে 'কল্লোল' পর্যন্ত), কথা সাহিত্য; নাট্যসাহিত্য; কাব্যসাহিত্য।]

#### (খ) উদ্ভূত অংশের ভিত্তিতে বিশেষ টীকা/ব্যাখ্যা/ভাষাগত প্রশ্ন।

### ৩। সাহিত্যের রূপ-রীতি (Genre) :

কাব্য : মহাকাব্য, গীতিকবিতা, সনেট

নাটক : ট্রাজেডি; কমেডি, প্রহসন; একাঙ্ক, পৌরাণিক; ঐতিহাসিক; সামাজিক; রূপক-সাংকেতিক

উপন্যাস : সামাজিক; আঞ্চলিক; ঐতিহাসিক

ছোটগল্প : রূপবৈচিত্র্য

প্রবন্ধ : বস্তুগত; ব্যক্তিগত

8। ব্যাকরণ :

(ক) ভাষা-উপভাষার সম্পর্ক। বাংলা কথ্য উপভাষা। বাংলা লেখ্য উপভাষা : পদ্য ও গদ্য (সাধু ও চলিত) বৈশিষ্ট্য, পার্থক্য, রূপান্তর।

(খ) ধ্বনিতত্ত্ব :

- (i) বাংলা স্বর ও ব্যঞ্জনধ্বনির পরিচয় ও শ্রেণিবিভাগ
- (ii) বাংলায় ধ্বনি পরিবর্তনের কয়েকটি বিশিষ্ট নিয়ম [স্বরভক্তি/বিপ্রকর্ষ; স্বরসংগতি; অপিনিহিতি; অভিশ্রুতি; সমীভবন; নাসিক্যভবন; মূর্ধন্যীভবন; অল্পপ্রাণীভবন; মহাপ্রাণীভবন, ঘোষীভবন; ধ্বনিবিপর্যয় (metathesis); সমাক্ষরলোপ (haplology); সাদৃশ্য (analogy)]
- (iii) সম্বন্ধি ও সম্বন্ধিবিচ্ছেদ (পাঠ্যপুস্তক-নির্ভর)।

(গ) রূপতত্ত্ব :

- (i) কারকবিভক্তি ও অনুসর্গ
- (ii) ব্যাসবাক্যসহ সমাস নির্ণয়
- (iii) প্রকৃতিপ্রত্যয় নির্ণয়
- (iv) ধাতু ও ক্রিয়াপদের বৈচিত্র্য

(ঘ) শব্দভান্ডার :

উৎপত্তি অনুসারে প্রদত্ত শব্দের বর্গ [তৎসম, অর্ধতৎসম, তদ্ভব, আগন্তুক, দেশি, সংকর] নির্ণয়

(ঙ) বাক্য :

- (i) গঠন ও অর্থ অনুসারে বাক্যের রূপান্তর
- (ii) বাচ্য-বাচ্যান্তর
- (iii) প্রকৃতিপ্রত্যয় নির্ণয় একই বিশেষ্য ও ক্রিয়াকে বিভিন্ন অর্থে ব্যবহার করে ভিন্ন ভিন্ন বাক্যগঠন
- (iv) ধাতু ও ক্রিয়া প্রচলিত বাংলা বাগ্‌ধারা অবলম্বনে বাক্যগঠন

(চ) শব্দার্থতত্ত্ব :

- (i) অর্থ পরিবর্তনের প্রধান প্রধান কারণ
- (ii) অর্থ পরিবর্তনের বিভিন্ন ধারা : (১) অর্থবিস্তার, (২) অর্থসংকোচ এবং (৩) অর্থসংক্রম বা অর্থসংলোম

## **BIOLOGICAL SCIENCE (HONS./PG) [ CODE -05]**

### **ZOOLOGY**

#### **Invertebrates:**

1. Classification of major phyla upto subclass with examples.
2. Special features: Reproduction a Protozoa. Polymorphism of Siphonophora, Respiration in Arthropod. Nervous system in Gastropod. Water vascular system in Starfish.

#### **Chordates:**

1. Classification of Amphibians. Reptilians & Mammalians upto order with Examples.
2. Special features, Lateral sense organ in fishes. Non-poisonous and poisonous snakes. Heart and aortic arches, Brain in man Exoskeleton structures in bird.

#### **Cytology, Histology & development Biology:**

1. Structure & function of plasma membrane. Mitochondria, Golgi complex and Endoplasmic reticulum.
2. Nucleic Acids: DNA-Physico Chemical structure-replication, transcription & role in cell cycle, RNA types: Structure of RNA function & role in protein synthesis.
3. Histology of Liver, Pancreas and Kidney.
4. Histological technique: Fixation & Fixative. Outline classification of dyes.
5. Outline knowledge of Gametogenesis; Ultra structure of sperm & ovum.
6. Morphogenetic movements and fate map.
7. Concept of organizers in development.
8. Organogenesis: Development of eye in chick.
9. Placenta types, structure and functions in rodents.

#### **Distribution, Evolutionary Biology & Systematics:**

1. Zoogeographical realms and subdivisions & their characteristic fauna.
2. Chemical basis of Origin of life.
3. Modern concept of evolution-Neo-Darwinism and Harby-Weinberg equilibrium.
4. Adaptation types: Adaptive radiation & adaptive convergence in mammals: Desert adaptation,
5. Biological species concept.
6. Importance of classification; Principles of zoological nomenclature.
7. Modes of speciation-Sympatric, allopatric&parapatire processes.

#### **Ecology, Animal behaviour, Biodiversity & Conservation:**

1. Energy flow in the ecosystem.
2. Population Ecology: growth forms; regulation of population density.
3. Community ecology: habitat & niche concept. Resource partitioning, species diversity.
4. Ecological succession.
5. Instinctive and learning behaviour.
6. Complex behaviour: fixed action pattern; circadian, rhythm; migratory behaviour in bird.



7. Concept of biodiversity: Types of biodiversity & its importance mega diversity zones & Biodiversity Hotspots with special reference to India.
8. Concept of conservation: in situ and ex situ methods.
9. Wildlife conservations strategies.

**Parasitology & Immunology:**

1. Lifecycle, pathogenecity, clinical features & control of *-Plasmodium vivax, and Wuchereria bancrofti*
2. Mosquitoes as vector for disease transmission.
3. Classification of immunoglobulin; acquired & innate immune system; lymphoid & myeloid cells in immune system: T & B cell co-operation: macrophage.

**Genetics & Molecular Biology:**

1. Cell cycle.
2. Allele concept, multiple allele (ABO blood group); pseudo allele; isoallele; **allelic** interaction.
3. Sex determination with special reference to Drosophila and Man.
4. Gene as a structural & functional unit — cistron concept; one gene-one polypeptide; sickle cell anemia; thalassemia.
5. Genetics and molecular biology of replication, transcription and translation.
6. Mutation-types, detection, molecular mechanism, chromosomal aberration.
7. Elementary idea of DNA finger printing, PCR, cloning, oncogene.

**Animal Physiology & Biochemistry:**

1. Enzymes: Classes, kinetics and factors affecting it.
2. Structure and function of haemoglobin.
3. Structure of mammalian nephron; Physiology of urine formation; osmoregulators & osmoconformer.
4. Nature, origin and propagation of nerve impulse along a neuron.
5. Transport of oxygen & Carbon dioxide in mammals.
6. Elementary idea of structure of carbohydrate, protein & lipid.

**Endocrinology and reproductive biology:**

1. Endocrine glands and hormones — classification of hormones, mechanism and effects of hormonal actions.
2. Hormonal regulation of gametogenesis in males and females of mammals, reproductive cycle in mammals.
3. Brief notes on Endocrine disorders, RIA, ELISA, cry preservation of gametes.

**Environment Biology:**

1. Nature, sources & effects of major pollutants of air & water; noise

**pollution. Applied Zoology:**

1. Aquaculture: Induced breeding. Composite fish culture, Exotic fishes & their role. Freshwater & brackish water prawn culture.
2. Sericulture: Silk varieties in India; mulberry silkworm culture, diseases of silkworm and their control.
3. Biology & control of pests: Paddy pest (*Scirpophegor in ortutus*) Anomies sobulifra stored grain pest (*Sitophilus oryzea*) rodent pest (*Bandicoota begabusi*) Biological and Integrated Pest Management.
4. Animal husbandry: common dairy breeds (cow); techniques of dairy management (brief idea); common poultry breeds (fowl) rearing methods, diseases & control.

## **BOTANY**

### **A. CELL:**

- (a) Prokaryotes and Eukaryotes: Characteristics, and differences with reference to their Nuclear and cell wall compositions.
- (b) Structure, function and significance of cellular organelles and cell membrane. Chromosomes: Ultra-structures and chemical compositions.

### **B. PLANTANATOMY**

Plant Tissue: Definition, Classification, Distribution and Functions including Mechanical tissues. Stele: Types & Evolution.

Normal and anomalous secondary growth in stems and roots in plants.

Root-stem Transition.

### **C. ECOLOGY AND ENVIRONMENT:**

Divisions of ecology, ecological factors, ecological units; Energy flow in ecosystem; Ecological niche; General ideas about global warming; Eutrophication; Ozone depletion; Acid rain; Sustainable development.

Afforestation -Process and significance; Biosphere Reserve. Pollution air, water and soil.

### **D. PLANT GROUPS:**

1. ALGAE: Range of thallus structures; Economic importance (as food, fodder, fertilizer and sources of iodine, laminarine starch, phycocolloid, agar, algin diatomite).
2. FUNGI: Structure of cell wall, mycelium, spore forms reproduction types: Homo- and heterothallism, Parasexuality. Economic importance.
3. BRYOPHYTES & PTERIDOPHYTES: Structural organization of gametophytes and sporophytes - a brief knowledge. Economic importance.
4. GYMNOSPERMS & ANGIOSPERMS: Structural organization of ovule, male and female gametophytes in cycas and pinus post-fertilization changes in embryo-sac in angiosperms.

### **E. PLANT PATHOLOGY:**

Necrosis, hypoplastic and hyperplastic symptoms of plant diseases, mechanism of infection Disease control - a brief knowledge, with emphasis on chemical and biological control.

### **F. TAXONOMY:**

Concept of artificial, natural and phylogenetic system of classification; Outline classification of Cronquist (1981). Role of Cytology and Phytochemistry in taxonomic studies. Diagnostic characters, evolutionary significance of the following families: Magnoliaceae, Nymphaeaceae, Compositae (Asteraceae). Alismataceae, Poaceae (Gramineae) and Orchidaceae.

ICBN-principles, rules of priority, effective and valid publication, brief note on cladistics. Functions of Herbaria and Botanical Gardens; Biodiversity and conservation - in-situ and ex-situ, Brief note on IUCN and Biosphere Reserves.

### **G. PALEOBOTANY:**

Fossils — Types, processes of fossilization, Geological time scale.

### **H. PLANT PHYSIOLOGY:**

- (b) Preliminary ideas about acid, base, and buffer.

- (c) Transpiration: Mechanism and factors affecting it.
- (d) Role of mineral elements in plants.
- (e) Photosynthesis: Photosynthetic pigments and their properties, photo-phosphorylation. Calvin cycle, C4-cycle & photorespiration, CAM.
- (f) Respiration- Concept of fermentation in terms of Industrial Bio-technology, Glycolysis, pentose phosphate pathway, Kreb's cycle and Electron transport system.
- (g) Hormones-Role of auxin, gibberellins, cytokinins, ethylene and abscisic acid in plant growth and development.
- (h) Enzymes: Definition; Properties of Enzymes, and types of enzymes.

#### **I. PLANT BIOCHEMISTRY:**

General Chemistry of carbohydrate, protein and fat. **J.**

#### **CYTOGENETICS & PLANT BREEDING:**

Cell Cycle - Definition and different phases. Mendelism, Linkage and Crossing over

-Types with examples Chromosome aberration, Aneuploidy, Euploidy; Gene Mutation

-Definition, types and importance, Gene regulation (Operation concept), genetic

code, protein synthesis, Brief Knowledge about Transposon.

Oncogene, Gene cloning, Gene transfer ,PCR.

Definition, methods and importance of mass selection, pureline selection,

hybridization and hybrid vigour. Tissue culture- Definition, Types and Prospects in

Agriculture and Forestry.

#### **K. PHARMACOGNOZY:**

Active principles, macroscopic, microscopic characters and uses of the following drug-yielding plants: *Azadirachta* (neem) *Andrographis* (Kalmegh), *Rauwolfia*.

#### **L. MICROBIOLOGY:**

Virus: general properties, structure of bacteriophage; concept of Plasmid. Electron

microscopic structure of a bacterial cell. Development of endospore. Process of

Transduction. Nutritional groups of Bacteria (Photo-autotroph.

Chemoautotroph, Photoorganotroph and Chemoorganotroph).

### **PHYSIOLOGY**

#### **1. Cellular Physiology:**

Molecular structure of cell membrane and mitochondria.

Enzymes . Properties, mechanism and kinetics of action, regulation of enzyme action, enzyme inhibitors.

#### **2. Biochemistry & Metabolism:**

Chemistry of carbohydrates, proteins, lipids and nucleic acids. Metabolic pathways

-glycolysis, HMP shunt, TCA cycle, beta-oxidation of fatty acids, glycogenesis cholesterol synthesis, protein synthesis, purine and pyrimidine biosynthesis. Hormonal regulation of metabolic pathways. Oxidative phosphorylation.

#### **3. Nutrition & Dietetics:**

Digestion and absorption of nutrients, composition, functions and regulations of salivary

juice, gastric juice, pancreatic juice and bile, Balanced diet, RDA, BMR, RQ, Specific dynamic action. Calorie value of foods, Biological value of proteins, NPU Vitamins

-sources, functions, deficiency symptoms, hypervitaminosis, antivitamins. Minerals . functions and deficiency symptoms. Undernutrition and overnutrition. Diet

- chart formulation for adult person and pregnant woman.
4. **Body fluid and Immunology:**  
Composition and functions of blood. Buffers in blood and regulation of blood pH. Coagulation of blood. Blood Groups. Formation, circulation and functions of lymph and tissue fluid. Immunity -Innate and acquired immunity, Humoral and cell mediated immunity. Hypersensitivity, Acquired Immuno Deficiency Syndrome.
  5. **Heart & Circulation:**  
Heart rate and its regulation. Cardiac output-measurement and factors affecting. ECG-normal ECG, leads, vectorcardiogram. Blood pressure-vasomotor centres, vasomotor reflexes, capacitance and resistance vessels. Molecular mechanism of vasoconstriction and vasodilatation. Hypertension, arterial and venous pulse. Peculiarities of coronary and cerebral circulation.
  6. **Respiration:**  
Volumes and capacities of lungs, Mechanics of breathing-lung compliance, intrathoracic & intrapleural pressure, surfactant, work of breathing, Hypoxia, Oxygen toxicity Neural centers and reflexes regulating respiration.
  7. **Physiology of Excitable Tissue:**  
Molecular mechanism of contraction and relaxation of different types of muscles, Sarcotubular system and excitation-contraction coupling. Different elastic components of muscles, Heat production in muscles during activity.  
Nerve impulse. Compound action potential of nerve. Membrane current and conductance. Voltage gated channels, molecular basis of synaptic transmission.  
Electron microscopic structure of myo neural junction-active zones, gutter, post synaptic receptors, EPP, MEPP.
  8. **Nervous System:**  
Stretch reflex, inverse myotonic reflex, muscle spindle, proprioceptive reflex, spinal shock, Structure, connections and functions of cerebellum, basal ganglia, thalamus, Hypothalamic control of food and water intake, neuro-endocrine functions. Functions of association cortex, Asymmetric functions of cerebral cortex, Functions of limbic system, Neural basis of memory. Sleep and REM Sleep. Impulse transmission in autonomic ganglia. Molecular basis of autonomic neural activity on effector organs.
  9. **Special Senses:**  
Receptors as biological transducer, Muller's law of specific nerve energies, Transduction mechanism in rods and cones, auditory hair cells, gustatory and olfactory Neural basis of sensory coding . Pitch And loudness perception, odor and taste discrimination, physiology of colour vision, visual acuity.
  10. **Renal Physiology:**  
Histological structure of nephron and filtering membrane, glomerular filtration, counter current exchanger and multiplier. Physiological mechanism of tubular reabsorption and secretion. Diuresis. JG apparatus.
  11. **Endocrine system and Chronobiology:**  
Physiological functions of the hormones - pituitary, thyroid, parathyroid, pancreas, adrenal. Cell signaling mechanism of hormones - cAMP, IP<sub>3</sub> , DAG, Tyrosine kinase, Jak-STAT Pathway. Hypo and hyperactive states of endocrine glands- Acromegaly, Frolich's Syndrome, hashimoto's disease, Cushing's syndrome, Pheochromocytoma, Biorhythm, Zeitgeber, Free running rhythms, Cardiac rhythm in adrenal, pineal and sleep-wake behaviour, neural basis of single and multiple oscillators of cardiac rhythm jet-lag..

12. **Reproductive Physiology:**  
Hormonal control of ovulation. Physiology of implantation, Hormonal control of pregnancy and lactation, Spermatogenesis and its hormonal control. Control of fertility and population.
13. **Exercise and Sports Physiology:**  
Maximum aerobic power and factors affecting it. Excess post exercise oxygen consumption (EPEOC). Effect of training on physiological systems. Anaerobic threshold. Anaerobic capacity. Anaerobic and aerobic requirements in different sports activities. **Body**
14. **temperature Regulation:**  
Structure of skin, composition of sweat, channels of heat loss and gain. Neural and humoral control of body temperature. **Environmental Physiology:**
15. Physiological changes in extreme environment: Hot, Cold, Hypobaric and Hyperbaric conditions. Heat stress. Acclimatization in high altitude, hot and cold environment Cardiovascular and respiratory effects of positive and negative G-Forces, Noise pollution and its impact on human life, Ionizing radiation hazards, Toxicology of industrial wastes-diseases due to excess accumulation of Pb, Hg and Cd in body. Addiction to tobacco, alcohol and narcotics, Over population . its causes and effects. **Biomedical Instruments:**
16. Basic principles and uses of following instruments: UV - Spectrophotometer, ECG, EMG, EEG, Pulmonary function analyzer, CT Scan, MRI, Ultrasonography (USG), Dialyser, Pacemaker, Endoscopy.

## CHEMISTRY (HONS./PG) [CODE -06]

### Unit. 1: Physical Chemistry (1)

#### Physical States of Matter, Physical Properties & Molecular Structure :

**SECTION A:** The gaseous state: The mean free path, binary collision frequency (single gas), their dependence on temperature and pressure. Real gases-detailed study of van der Waals' equation, Critical constants of gases, the rule of Cailletet and Mathias.

The reduced equation of state and the principle of corresponding states. Maxwell's law of distribution of molecular velocities (derivation not required), effect of temperature on the distribution. Expressions for various types of velocities from Maxwell's equation. Kinetic energy distribution. Boltzmann factor and the Boltzmann equation. The barometric formula. **SECTION B:** The liquid state: Surface tension: measurement, applications and temperature dependence.

**SECTION C:** (i) Elementary ideas of crystallography -Laws of crystallography,

crystal lattice, simple crystal system, ionic and covalent crystals, Bragg's method of crystal analysis with illustration of NaCl and KCl crystal faces, Born-Haber cycle.

(ii) Heat capacity of solids, Einstein's specific heat equations, Debye's  $T^3$ - Law (detailed deduction not required).

#### **SECTION D: Colloidal system:**

(i) Properties of colloids; optical, kinetic and electrical

(ii) Electro kinetic phenomena; charge and stability of colloids, mechanism of coagulation (iii) Determination of Avogadro's number from Perrin distribution equation and Einstein's diffusion equation, (iv) Ultracentrifuge, Determination of size of colloid particles and molecular weights of macro-molecules, (v) Colloidal electrolytes and their properties (soaps and detergents, Critical micellization concentration), proteins.

#### **SECTION E: Physical properties and molecular structure:**

(i) Polar molecules and dipole moment (derivations of equations not required). (ii) Elementary ideas on molecular spectra, potential energy curves and Raman Spectra, with applications.

### Unit. 2: Physical Chemistry (2)

#### Thermodynamics & Its Applications to Equilibrium processes :

##### **SECTION A: Thermodynamics:**

(i) Heats of solution and dilution, heats of neutralization from bond enthalpies, Kerchief's equation. (ii) Carnot's theorem, thermodynamic scale of temperature, refrigeration cycle. (iii) Detailed treatment of entropy, free energy, Gibbs-Helmholtz

equation, Partial molal quantities, Gibb's potential, Gibbs-potential, Gibbs-Duhem equation, Maxwell's relations. Thermodynamic equation of state. Elementary idea of entropy and probability.

- (iv) Applications of thermodynamics: Clausius-Clapeyron equation. Nernst distribution law, Joule-Thomson effect, expression for  $(C_p - C_v)$  for van der Waals gases.
- (v) Elements of statistical thermodynamics, Boltzmann distribution, partition functions and their relations with thermodynamic state functions.

**SECTION B:**  
Experimental

- (i) Chemical equilibria: homogeneous equilibria.

determination of equilibrium constants. Thermodynamic derivation of the law of mass action. The reaction isotherm & temperature dependence of equilibrium constants (van't Hoff equation).

- (ii) Ionic equilibria-Determination of hydrolysis constant and degree of hydrolysis, Buffer capacity. Neutralisation indicators. theory and application, (pH titration curves). Relative strengths of acids and bases.

**SECTION C:** Electromotive force — Different types of electrodes, glass and quinhydrone electrodes, important reference electrodes. Thermodynamics of a reversible chemical cell, standard electrode potentials and standard emf of Chemical cell (Nernst equation); Concentration cells, liquid junction potential, salt bridge. Redox potential, Redox series, Redox indicators (Theory and applications), Decomposition potentials, polarization, overvoltage, Dry cells (Leclanche cell), accumulators (acid and alkali). Applications of e.m.f. measurements-Thermodynamic parameters of electrochemical reactions (enthalpy, entropy and free energy), determination of solubility products, transport numbers, pH,  $K_w$ , valencies of ions and dissociation constants of weak electrolytes. Potentiometric titrations. **SECTION D:** Colligative properties: Thermodynamic derivation of Raoult law for lowering of vapour pressure, elevation of boiling point and depression of freezing point, van't Hoff's osmotic pressure equation, interrelationships; between the different colligative properties, abnormal colligative properties. **SECTION E:** Equilibrium in heterogeneous systems & phase equilibria.

- (i) Derivation of phase rule; its significance. Duhem Margules equation.

- (ii) One component system . carbon dioxide, water, sulfur.

**Unit. 3: Physical Chemistry (3)**

**Transport Phenomenon: Kinetics & Catalysis: Photochemistry Adsorption & Surface Phenomenon:**

**SECTION A:** Viscosity of gases and liquids, viscosity coefficients, and their dependence on temperature. Stoke's Law and terminal velocity, diffusion of gases and solutes in solution (Fick's law).

**SECTION B:** Electrochemistry:

- (i) Electrolytic conductance, Transport numbers and their interpretations; hydration of ions. Determination of ionic speeds. Qualitative treatment of Onsager equation and Debye Huckel theory.

**SECTION C:** Chemical Kinetics:

- (i) Order and molecularity of a reaction, first and second order Kinetics. Determination of the order of a reaction. Zero and fractional order reactions. (ii) Influence of temperature on the speed of a reaction. Arrhenius equation. Mechanism of uni- and bimolecular reactions from collision theory (detailed) and transition state theory (elementary). (iii) Simultaneous reactions: Parallel, consecutive and opposing reactions (simple-treatment), chain reaction (Hydrogen-Bromine reaction). **SECTION D:**

Adsorption and surface chemistry:

- (i) The phenomenon of adsorption on liquid and solid surfaces, Freundlich and Langmuir adsorption isotherms. B. E. T. equation (without derivation), surface area of adsorbents. (ii) Gibb's adsorption isotherm. Application of adsorption. **SECTION E:** Catalysis: (i) Catalytic process: Theories of homogeneous and heterogeneous catalysis (single reactant case) (ii) Acid-base catalysis. Kinetic salt effects. (iii) Enzyme catalysis and its characteristics. (iv) Application of catalysis in different fields.

**SECTION F:** Photochemistry:

- (i) Elementary principles of spectrophotometry -Lambert-Beers' law and its applications: (ii) Laws of photochemical reactions; H-Br reaction, H-Cl reactions, HI decomposition, photosensitized reactions, photochemical equilibrium. (iii) Elementary ideas of fluorescences and phosphorescence.

**Unit. 4: Inorganic Chemistry (1) Atomic Structure; Radioactivity & Nuclear Chemistry; Chemical Bonding :**

**SECTION A:** (i) Qualitative idea on Black-body radiation, photo-electric Effect and

- Compton effect, Plank's quantum equation. (ii) Atomic spectra of hydrogen. Bohr's Theory of hydrogen atom (simple mathematical treatment). Sommerfeld extension. Limitation of Bohr-Sommerfeld theory. Quantum numbers, their significance; s,p,d,f. atomic orbitals. Sequence of energy levels. Aufbau principle, Hund's rule, Pauli exclusion principle. Electronic configuration of elements, ground state terms of many electron atoms and ions. (iii) Wave-particle duality, Heisenberg Uncertainty principle, de-Broglie relationship, Schrodinger wave equation, wave mechanical interpretation of orbital, probability distribution curves, shapes of s, p, d and f orbitals (qualitative).



**SECTION B:** Radioactive decay,  $\alpha$ - $\beta$   $\gamma$ -rays; half life and average life of radioelements. Characteristics of radioactive decay series (different types) and Uranium decay series, Group displacement Law, radioactive equilibrium, Nuclear binding energy (including determining factors), stability of nuclei. Nuclear reactions, (different common types); projectiles, target nuclei, compound nuclei, spallation reaction, Nuclear energy. Elementary ideas on Nuclear fission and fusion reactions. Radio carbon dating, Age of mineral (elementary principle only), Isotope exchange. Separation and uses of isotopes.

**SECTION C:** Nature of chemical bond, Ionic bond, Lattice energy, Solvation energy, Born-Haber cycle (including mathematical calculation), Concepts of polarization, Fajan's rule. Ionic potential and its applications. Inert pair effect, Covalent bond and coordinate bond,  $\sigma$  - and  $\pi$ - bonds valence bond theory (simple mathematical treatment), assumptions, defects, Resonance. Molecular orbital theory (non-mathematical treatment), application to homonuclear diatomic molecules:  $H_2$  to  $F_2$  and heteronuclear diatomic molecules. NO, CO and HF and  $H_2O$ ,  $BeF_2$ ,  $CO_2$ , Bond orders; Hybridization, Bent's rule, shapes of molecules, VSEPR theory. Hydrogen bond and its effects on physical properties, Intermolecular forces (elementary idea), Metallic bond, (qualitative bond theory), conductors, semiconductors, superconductors, insulators. **Unit. 5: Inorganic Chemistry (5)**

**Chemical Periodicity; Acid-Base, Solvents & Redox Systems: s- & p- Block Elements & Their Compounds :**

**SECTION A:** Periodic classification of elements on the basis of electronic configuration and periodic variation of properties; atomic radii, ionic radii, ionization energy; Slater's rule; electron affinity, electro negativity concept (Pauling & Allred-Rochow scales).

**SECTION B:** Modern concept of acids and bases including SHAB principle, strengths of acids and bases (qualitative idea). Non-aqueous solvents; Liquid ammonia & liquid  $SO_2$  as solvents, Redox potentials. Formal potentials, applications of redox potentials, variation of redox potentials, under the influence of pH, precipitation and complex formation; disproportionation. Choice of indicators in redox titrations. Redox potential diagrams and their applications.

**SECTION C:** Noble gases; isolation properties and structure of compounds of noble gases.

**SECTION D:** B, Al, Ga, In, Ti- General group comparison. Boric acid, Borax, Boron nitrides, Borazine, Diborane, Borohydrides.

**SECTION E:** C, Si, Ge, Sn, Pb-General group comparison. Carbides, silanes, silicon halides, silicic acids, silicones, silicates.

**SECTION F:** N, P, As, Sb, Bi-General group comparison, Elemental states of P, As, Sb, Bi; Oxides and Oxyacids of Nitrogen and Phosphorus, Hydrazine, Hydroxylamine, Hydrazoic acid, Halides of nitrogen and phosphorus, Nitrides, condensed phosphorus, Phosphonitrite compounds.

**SECTION G:** O, S, Se, Te - General group comparison. Hydrides, Halides, Elemental states of S, Se, Te: Oxides and Oxyacids of Sulphur, Selenium and

Tellurium. Thionic acids, sodium thiosulfate, polysulphides, hydrogen peroxide, ozone, peroxyacids of sulphur.

**SECTION H:** F, Cl, Br, I. General group comparison. Elemental fluorine, Oxygen fluoride, Oxides and Oxyacids of Cl, Br, and I, Interhalogens and Polyhalides, Basic properties of halogens. Pseudohalogens. Fluorocarbons.

### **Unit. 6: Inorganic Chemistry(6)**

#### **d- Block Elements & Their Compounds: Coordination Chemistry & Organometallics:**

**SECTION A:** Terrestrial abundance of the metals; elementary idea of mineral formation; General methods of isolation of metals from their natural sources of occurrence (technical details omitted) Availability in India and the chemistry of isolation of the following metals: Li, Rb, Cs, Ag, Au, Ti, V, Cr, Mn, Co, Ni, Pt, Ra, U.

**SECTION B:** Study of the elements of Group IA, IB, IIA and IIB with reference to their chemical reactions and properties (specially redox and coordination)

**SECTION C:** General characteristics of first row transition metals with reference to electronic configuration, oxidation states, redox properties, colour of the ions. Magnetic properties of first transition metal ions and their complexes. Determination of magnetic susceptibility and its application to complex compounds, Polyvanadates.

**SECTION D:** Introduction to coordination compounds. Werner's theory, Nomenclature of coordination compounds upto two metal atoms, Types of ligands, Chelates and inner-metallic complexes and their applications in chemical analyses. Isomerism of coordination compounds: different types; geometrical and optical isomerisms for coordination numbers 4 and 6. Trans effect. Study of complexes in solution: detection, composition (Job's, slope ratio and mole ratio methods), stability-potentiometric method. Metal-ligand interactions: Valence Bond and Crystal Field Theories. Application of VB and CFT approaches in explaining stereochemistry, magnetic and spectral features ( $d^1-d^9$  systems) of coordination compounds (coord. No. upto six) Introduction of ligand field theory (qualitative treatment only). Metal-ligand bonding, MO concept,  $\sigma$ - and  $\pi$ - bondings in complexes.

**SECTION E:** Metal complexes of  $\pi$  acids ligands: carbonyls, nitrosyls and cyanides. Introduction of  $\sigma$  bonded and non-classically bonded organometallics, metal (mono) olefins-Zeise's salt; Metallocenes; Ferrocene, Metal-metal bonded complexes; inorganic rings, cages and clusters; boron cage compounds, carboranes and metallocene carboranes. Catalysis by organometallic complexes; substitution, oxidative addition, reductive elimination, insertion reactions, hydrogenation, hydroformylation and polymerization of alkenes; fluxional molecules. **Unit. 7: Organic Chemistry (1)**

**SECTION A:** Nature of bonds in organic compounds: Atomic orbitals, Molecular orbitals: bonding, non-bonding and antibonding. Hybridisation of atomic orbitals with reference of C, N, Cl, Br, I, O; Sigma and Pi-bonds;

electronegativity ; Dipole moment (bond moment, group moment, polarization and polarisability of covalent bond). Inductive and effectromeric effects. Energetics of bond cleavage and bond formation; Bond energies and bond distances; Carbocations, carbanions, Free radicl, ambident ions (definitions, examples). Conjugation, Resonance, Hyperconnugation; Tautomerism with reference to the following systems only Keto-Enol, Nitro-Acinitro, Nitroso-Oximino. Strength of organic acids and bases.

**SECTION B:** Optical activity, optical rotations: Recemisation; Elements of symmetry, asymmetric and dissymmetric moleculses, configuration and conformation, acyclic systems. D.L. and R. s. nomenclatures of acyclic systems. Erythro and Thero configurations. Fischer, sawhorse and Newman projection formula; Geometrical isomerism involving C=C and C=N bonds.

**SECTION C:** Investigation of reaction mechanisms: Rate law of a reaction; Activation energy, Transition state, Reaction intermediates, energy profile diagrams involving two transition states. Idea of a reversibility of a reaction, Kinetically and Thermodynamically controlled products: Primary kinetic isotope effects; classification of reagents and reactions; steric inhibition and steric strain in organic molecules. Pericyclic reactions, electrocyclic opening and closure.

**SECTION D:** Mechanism of organic reactions- What and Why ? Addition reactions: Electrophilic, Nucleophilic and Radical. Classical and non-classical carbonium ion. Comparative study of (i) electrophilic addition at C=C; (ii) Nucleophilic addition at C=O group of aldehydes and ketons; (iii) Nucleophilic substitution at C=O group of acids and their derivatives; Substitution reaction at the saturated carbon atom (SN<sub>1</sub> SN<sub>2</sub>, SN<sub>i</sub>); and the aromatic system (SE<sub>2</sub>), Elimination reactions: beta elimination (E<sub>1</sub>, E<sub>2</sub> and E<sub>1</sub> cB) and alpha elimination carbenes; polymerization reactions: Ionic and Free radical mechanisms.

**SECTION E:** Stereoche mistry: Atropisomerism-Byphenyls (excluding R-S configuration). Substituted aliens. Resolution of recemic modifications. Walden inversion, Mutarotation, Asymmetric synthesis, Epimerisation; Elementary idea of sterospecific and stereosclecive reactions.

**SECTION F:** Melecular Rearrangements: Allylic, Claisen Pinacol pinacolone. Acyclic systems: Hofmann, Lossen Curtius, Schmidt, Fries and Beckmann. Cyclic systems: Demjanov and Favorskii.

**SECTION G:** Elementary idea of the applications of U. VIR and H-NMR spectroscopy

for simple organic molecules.

## **Unit. 8 : Organic Chemistry (2)**

**SECTION A:** Aliphatic Compounds:

Nomenclature and general methods of preparation, properties and reactions with mechanism in respect of the following: (i) Hydrocarbons . Alkanes, Alkenes, Alkaienes, Alkynes and their halogen derivatives, (ii) Monohydric alcohols; (iii) Ethers and thioethers; (iv) Carbonyl compounds;

- (v) Saturated monocarboxylic acids and their derivatives;
- (vi) Alkyl nitrites, Nitroalkanes, Nitriles, Isonitriles, Amines, Urea, Diazomethane, Diazoacetic ester.
- (vii) Amino acids and proteins: Definition and Classification; Syntheses (by Gabriel phthalimide method, Strecker's method and Azlactone method), properties and reactions of Glycine and Alanine; Tests, peptide linkage and its geometry.
- (viii) Carbanion Chemistry with reference to acetoacetic ester, malonic ester and cyanoacetic ester. **SECTION B:**

Alicyclic Compounds: General methods of preparation, properties and reactions with mechanism of alicyclic compounds (one ring only) with upto six carbon atoms; Bayer Strain theory; Conformational aspects boat, half-chair and chair forms; axial and equatorial bonds, Conformation, reactions of mono- and di-substituted derivatives only. **SECTION C:** General methods of preparation, properties, reactions, structure and

synthetic uses of Grignard reagents; preparation and uses of Li and Zn alkyls. **SECTION D:** Carbohydrates: Nomenclature:

Classification; Reactions and structure

elucidation of Glucose and Fructose: Ascending and descending in sugar series. Aldopentoses. Aldohexoses; Ketopentoses and Ketohexoses; Interconversion of aldohexose to ketohexose and vice versa; Configuration of Arabinose, Glucose, Fructose; Conformation of Glucose; Inversion of Sucrose; Ring-chain tautomerism.

### Unit. 9 : Organic Chemistry (3)

**SECTION A:** Aromatic Compounds:

- (i) Idea of aromatic compounds upto-pi-electron system; Aromaticity and Aromatic character;
- (ii) Benzene: Modern idea of structure, Electrophilic substitution; preparation properties and important reactions with mechanism of homologues of benzene, halogen derivatives; Nucleophilic and cine substitution: Benzyne intermediates; Orientation and reactivity—mechanistic approach.
- (iii) Aromatic nitro compounds: General methods of preparation, properties, reactions with mechanism.
- (iv) General methods of preparation, properties and reactions with mechanism of the following classes of compounds: Phenols, Aromatic alcohols, Aromatic aldehydes, Aromatic Ketones, Aromatic carboxylic acids and their derivatives, Phenolic aldehydes and ketones, Phenolic acids, Nitro phenols, Benzoquinones and aromatic sulphonic acids.
- (v) Aromatic diazo compounds: preparation, properties and reactions with mechanism.
- (vi) General methods of preparation, properties and reactions with mechanism of the following classes of compounds: Phenols, Aromatic alcohols, Aromatic aldehydes, Aromatic Ketones, Aromatic carboxylic acids and their derivatives, Phenolic aldehydes and ketones, Phenolic acids, Nitro phenols, Benzoquinones and aromatic sulphonic acids.

(vii) General methods of preparation properties, reactions with mechanism of the following bi-functional compounds: Diols, Hydroxy ketons, Hydroxy aldehydes, Dicarbonyl compounds (alpha, beta and gamma) keto acids, unsaturated aldehydes. Unsaturated ketones, Unsaturated acids, Lactons.

**SECTION B:** Polynuclear hydrocarbons: Synthesis, reactions and structures of Naphthalene and Anthracene; Synthesis (only) of Phenanthrene.

**SECTION C:** Heterocyclic Compounds: General methods of synthesis, properties and important reactions of the following compounds. Pyrrole, Furan, Thiophene, Pyridine, Quinoline and Indole and derivatives of Pyrrole and Pyridine.

**SECTION D:** Dyes: Classification, Elementary idea of colour and constitution; Preparation and uses of Phenolphthalein, Methyl orange, Congo red, Malachite green, Alizarin and Indigo.

**SECTION E:** Problems incorporating reactions including in the syllabus. **Unit. 10: Advanced Level Chemistry & Application Oriented Chemistry:**

**SECTION A:** Bioinorganic Chemistry

Essential and trace elements of life, role of metal ions ( $\text{Na}^+$ ,  $\text{K}^+$ ,  $\text{Mg}^{2-}$ ,  $\text{Ca}^{2+}$ ,  $\text{Fe}^{3+}/^{2+}$ ,  $\text{Cu}^{2+}/^{1+}$ ,  $\text{Zn}^{2+}$ ) in biology. Basic reactions in the biological systems. Transport of ion across biological membrane,  $\text{Na}^+$  ion pump. Transport and storage of metabolic energy, ATP-ADP interconversion.  $\text{O}_2$  - uptake proteins: hemoglobin and myoglobin; electron transport proteins: cytochromes and ferredoxins; redox metalloenzymes: catalase, peroxidase, super oxide dismutase, ascorbate oxidase. Bioinorganic chemistry of nitrogen fixation, respiratory electron transport chain, photosynthesis. Toxic effects of metal ions, Chelation therapy, metal dependent diseases, metal complexes as drugs.

**SECTION B:** Chemical Analysis: Principles & Applications: Gravimetric and titrimetric (acid-base, redox, complexometric EDTA) estimations of common cations and anions (single & in mixtures). Chemical separation techniques: chromatography, ion exchange, solvent extraction: Instrumental methods of analysis: conductometry, potentiometry, polarography, amperometry, UV-VIS spectrophotometry, flame photometry, AAS and AES spectrometry, neutron activation analysis. IR, NMR and ESR spectroscopy applications to simple inorganic and organic systems. Analysis of complex materials; ores, alloys, drugs, Pharmaceuticals, air and water samples. Error analysis.

**SECTION C:** Chemistry on Materials:

Production and uses of stainless steels and alloy steels, glass and ceramic materials, Port-land cement (composition and setting). Chemical and biofertilizers, natural and synthetic rubbers, synthetic fibres, biopolymers and biodegradable polymers; common drugs and Pharmaceuticals, common pesticides (applications and residual toxicity). Solid, liquid and gaseous fuels, coal based chemicals and petrochemicals ( $\text{C}_1$  to  $\text{C}_3$  compounds); oils, soaps and detergents, hydrogenation of oils, production of vanaspati and margarine. Constituents and

formulations of paints and varnishes, common cosmetics and perfumes, food additives and preservatives. SECTION D: Environmental chemistry

Environmental segments: atmosphere, hydrosphere, lithosphere and biosphere. Environmental cycles: hydrologic cycle, oxygen-, nitrogen-carbon, phosphorus-and sulfur cycles, composition and structure of the atmosphere. Chemical and photochemical reactions in the atmosphere, ozone layer and its importance. Major air pollutants and their sources, green house effect, acid rain, photochemical smog; air pollution control measures, Environmental role of water, major water pollutants, water quality parameters, water treatment: (domestic, industrial and waster water).

## **ECONOMICS (HONS./PG) | CODE -10|**

### **Group—A**

1. **DEFINITION AND SCOPE OF ECONOMICS**  
Basic problems in every economic society and their solution in different economic systems. A general view of the price system. The elementary theory of demand, supply and market price. The elasticities of demand and supply, Applications of the demand-supply apparatus in price control and rationing, taxation and in the determination of the prices of agricultural and manufactured goods.
2. **THEORY OF CONSUMER BEHAVIOUR**  
Concepts of cardinal and ordinal utility. the limitation of cardinal utility analysis. The Indifference Curve approach. Consumer's equilibrium. Income effect, substitution effect and price effect. The Revealed Preference approach.
3. **THE THEORY OF PRODUCTION**  
The concept of production function. Production with a single variable input. Production with two variable inputs. Optimal input combination. Cobb-Douglas production function.
4. **THE THEORY OF COST**  
Different concepts of cost. Short-run and long-run cost analysis.
5. **THE THEORY OF THE FIRM AND MARKET ORGANISATION**
  - A. Characteristics of perfect competition. Short-run and long-run equilibrium of the firm and the industry. Short-run and long-run supply curve of the firm and the industry.
  - B. Monopoly. Bases of Monopoly. Equilibrium under monopoly. Discriminating monopoly.
  - C. Characteristics of Monopolistic Competition and Oligopoly
6. **THE MARGINAL PRODUCTIVITY THEORY OF DISTRIBUTION**  
Rent and its determination. Supply of labour, determination of wages and the role of trade unions. Elements of profits. Concept of interest. gross and net interest, real and money interest.
7. **CONCEPT OF NATIONAL INCOME**  
Different methods of measuring national income. Difficulties in measurement. National Income Determination. Consumption Function and Multiplier. Investment and Saving. Government and the circular flow of income. Fiscal Policy.
8. **THE QUANTITY THEORY OF MONEY**  
Fisher's version and Cambridge version. Keynesian Liquidity Preference.
9. **BANKING**  
Functions of Central Banks and Commercial Banks; Credit Creation; Credit Control methods.
10. **CONCEPTS OF INFLATION, DEFLATION AND STAGFLATION**  
Demand-pull and cost-push inflation. Anti-inflationary monetary and fiscal policies.
11. **PUBLIC FINANCE**  
Principles of taxation. Incidence of taxes, Effects of taxation. Public Debt and its effects.
12. **INTERNATIONAL TRADE**  
Basis of trade, Gains from trade. Arguments for free trade and protection. Balance of Trade and balance of payments. Measures for correction of disequilibrium in balance of payments. The theory of exchange rates.

**Group—B**

13. **GROWTH AND DEVELOPMENT**  
Features of Less Developed Countries
14. **GENERAL FACTORS IN ECONOMIC DEVELOPMENT**  
Role of capital formation and the use of capital-output ratio in development planning. Population Growth and Economic Development.
15. **APPROCHES TO THE THEORY OF DEVELOPMENT**  
The Classical theory. The stages of economic growth — Marx and Rostow. Lewis model of development with unlimited labour supply.
16. **STRATEGY OF DEVELOPMENT**  
Choice of technique; Balanced vs. Unbalanced growth.
17. **INTERNATIONAL TRADE AND ECONOMIC DEVELOPMENT**  
Foreign Aid; Role of Multinational in developing countries. The I.M.F. and the World Bank.
18. **ENVIRONMENT AND ECONOMIC DEVELOPMENT**  
The problems of sustainable development.
19. **AGRICULTURE IN THE INDIAN ECONOMY**  
Land reforms; Agricultural labour, Agricultural finance, Technological changes . Their impact on the economy. Agricultural marketing. Public Distribution system.
20. **INDUSTRIAL PROBLEMS IN INDIA**  
Industrial Policy. Traditional and small scale industries. Some large scale industries — iron and steel, jute and cotton. Industrial Finance. Role and performance of the public sector. Industrial labour and industrial relations. Social Security for industrial workers.
21. **INDIAN BANKING SYSTEM AND MONETARY POLICIES**  
Reserve Bank of India — functions, methods of note issue and credit control instruments. Performance of the nationalized commercial banks in recent years. Inflation during the plan period.
22. **FISCAL POLICY IN INDIA**  
Revenue and expenditure of the Central Government. Revenue and expenditure of the West Bengal Government. Centre-State Financial relations.
23. **INDIAN FOREIGN TRADE AND BALANCE OF PAYMENTS**  
Changes in the pattern and direction of India fs exports and imports. India fs balance of payments. Government policies.
24. **INDIAN PLANNING**  
Overall objectives of the Five Year Plans. Achievements and failures. Economic Re-forms since 1991.



## EDUCATION (HONS./PG) [ CODE -11]

- I. Philosophical Foundations of Education**
  - (A) Concept and Aims of Education, Methods of Teaching and Role of Teachers in the light of Idealism, Naturalism, Pragmatism and Marxism.
  - (B) Philosophical and Psychological bases of Curriculum. Principles of Curriculum Construction. Evaluation of Madhyamik and H. S. Curriculum of W.B. in the light of the principles. Co-curricular activities. Freedom and discipline.
- II. Psychological Foundations of Education**
  - (A) Growth and development of the child — Stages and areas of development. Physical, Cognitive, Social and development upto the stage of adolescence. Intelligence-Concept and Two factor theory. Personality-Concept and Trait theory.
  - (B) Theories of Learning: Connectionism (Thorndike, Pavlov, Skinner) and cognitive (Gestalt). Factors affecting Learning: Maturation Interest, and Motivation. Memory and Attention.
- III. Sociological Foundations of Education**
  - (A) Social Groups: Primary and Secondary Social Processes: Associative and Dissociative. Education, Society and Social Change. Education and Socialization.
  - (B) Current sociological Problems of Education in India: Illiteracy and Universalisation of Primary Education Equality of Educational Opportunity — Education of SC, ST and OBC.
- IV. Historical Foundation of Education**
  - (A) Salient features of Brahmonic and Buddhist Education in Ancient India. Islamic Education in Mediaeval India.
  - (B) Landmarks in the History of India Education during pre-independence era; Serampore Missionary activities in education Macaulay's contribution to Indian education Wood's Despatch, Hunter Commission. Sadler Commission. Wardha Scheme, Sargent Report.
- V. Modern Development in Indian Education**
  - (A) Landmarks in the History of Indian Education during post-independents era with special reference to structure, curriculum, medium of instruction at the Primary and Secondary stages: Report of the Mudaliar Commission Radhakrishnan Commission, Kothari Commission, Ramamurti Committee and Mitra Commission. Salient features of Education Policy statement, 1968. National Policy on Education, 1986, Contemporary issues in education.
  - (B) Present structure, administration and progress of Primary and Secondary education in India, particularly in West Bengal.
- VI. Contribution of Great Educators**
  - (A) Indian—Vidyasagar, Vivekananda, Rabindranath, Mahatma Gandhi.
  - (B) Western — Rousseau, Pestalozzi, Dewey and Froebel with special emphasis on Aim of Education, Methodology, Discipline, Role of Teacher and their works.

**VII. Guidance in Education and Impact of Mass Media on Education**

**(A) Guidance and Counselling in Education**

Concept, Types and Tools of guidance and counselling. Techniques and importance of guidance and counselling. **(B) Impact of Mass Media on Education**

Print media, Cinema, Radio, Electronic media including Television.

**VIII. Mental Hygiene**

**(A) Concept and Criteria of Mental Health. Scope of Mental Hygiene.**

Maladjustment: Concept and types, Causes, prevention and remedies of maladjustment.

Adjustment Mechanism.

**(B) Mental disorder — classification and brief description**

Therapeutic measures : Psychoanalytic, Behaviouristic and Play Therapies.

**IX. Measurement and Evaluation in Education**

**(A) Concept of Measurement and Evaluation. Need and Scope of Evaluation in Education, Tools and Techniques of Evaluation. Construction and standardization of Achievement Tests. Defects of present system of Examination and Suggestions for its improvement.**

**(B) Different types of tests.**

Tests for the measurement of Intelligence, Interest and Personality

**X. Educational Statistics**

**(A) Need for Statistics in Education. Frequency Distribution, Graphical Representation of Data, Measures of Central Tendency, Measures of Variability.**

**(B) Normal Probability curve its properties and uses. Skewness and Kurtosis.**

Percentile and Percentile Rank. Derived Scores — Standard Score, T-Score, Coefficient of Correlation by Rank difference and product moment method.

## ENGLISH (HONS/PG) [ CODE -09]

### Poetry

Sidney	Loving in Truth
Spenser	One day I wrote her name
Shakespeare	Shall I compare thee...
John Donne	The Good Marrow
George Herbert	Virtue
Alexander Pope	The Rape of the Lock (Cantos I & II)
Blake	The Tyger; The Lamb
William Wordsworth	Tintern Abbey
Samuel Taylor Coleridge	Christabel; Kubla Khan
P. B. Shelley	Ode to the West Wind; to a Skylark
John Keats	Ode to a Nightingale; To Autumn
Alfred Tennyson	Ulysses
Robert Browning	My last Duchess
W.B. Yeats	The Wild Swans at Coole
Wilfred Owen	Strange Meeting
T.S. Eliot	Hollow Men

### Drama

Shakespeare	Macbeth
Goldsmith	She Stoops to Conquer
George Bernard Shaw	Arms and the Man
J. M. Synge	Riders To the sea

### Novel

Jane Austen	Pride and Prejudice
Charles Dickens	David Copperfield

### Short Story and Essay

#### A. Short Story

Joseph Conard	James Joyce	Somerset	The Lagoon
Maugham	Katherine	Mansfield	Araby

#### B. Essay

Charles Lamb	The Lotos Eater
	A Reverie; Dream Children :
	The Superannuated Man
	Freedom of Studies

#### G.B.Shaw Francis Bacon **Grammar and Usage**

Common Errors  
Subject Verb Agreement; Tenses; Active and Passive Voice, Articles, Prepositions, Adverbs, Adjective.  
Sentence Forms.  
Simple Compound, Complex, Relative Clauses.  
Joining and Splitting of Sentences.

Narration

Direct and Indirect

Composition

A single paragraph of about 50-60 words to be written on a given topic

Literary Devices:

Rhetoric and Prosody.

## COMPUTER APPLICATION (HONS./PG) [CODE-07]

### 1. **Computer Fundamentals:**

Parts of a computer, Block diagram of a computer system and brief description of each functional unit, Input and Output devices, Memory hierarchies, Application and System software, Computer Languages.

### 2. **Computer Arithmetic:**

Positional number systems and conversion of one base to another, Binary arithmetic, Negative number representation using 1's and 2's complement, Various codes: ASCII, EBCDIC, BCD, BCD arithmetic.

### 3. **Digital logic fundamentals:**

Boolean algebra: Concepts and basic postulates, Forming Boolean expression, Minimization of function using algebra and K-maps, Implementation using basic gates. Combinational Circuits: Half Adder, Full Adder, Multiplexer and Demultiplexer. Sequential Circuits: Flip flops and Counters.

### 4. **Operating System:**

Concept of Operating System, Functions of Operating System, Classification of Operating System, Process scheduling, Brief study about processor Management and memory management algorithm, Concept of Deadlock.

### 5. **Data Structures:**

Data types and Structures-definition, Concept of linear and nonlinear data structures, Linear data structure: Array, Linklist, Stack, Queue. Nonlinear data structure: Graph, Tree Brief Study of algorithm, Complexity of an algorithm, Studies of searching and Sorting algorithms.

### 6. **Programming Language:**

(a) C-Language:

Basic structure, Character set, Keywords, identifiers, Constant and variables-type declaration. Arithmetic, Relational, Logical and Assignment operator, Conditional Operator, Formatted Input and Output, Branching and Looping. Array-one dimensional and two dimensional, Pointers, Structure and Union, File handling.

(b) Object Oriented Programming:

Concept, Difference with procedure oriented programming, data abstraction-object, class and methods, inheritance and polymorphism, OO approach- C++ as OO language.

### 7. **DBMS:**

Advantage of using DBMS, Architecture, Relational Data Model, E-R data model, Writing of simple query, using relational algebra and SQL, Normalisation.

### 8. **Network:**

Goals of Computer Network, Performance of a network, LAN, MAN, WAN and internet, Various topologies and transmission media, OSI and TCP/IP Model, Concept of Protocols, Routing techniques, Switching techniques: Circuit and packet switching, Addressing schemes: Physical, logical and port addressing, Application of Network: e-mail, chatting, file transfer, Basic concept about WWW, DNS, URL.

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## **GEOGRAPHY (HONS./PG) [ CODE -12]**

**A. Geo-Tectonics:**

Earth's Crust (Composition and Layering); Rocks (Origin, Types and Characteristics); Folds and Faults (Types and Landforms); Mountain Building and Plate Tectonics, Continental Drift. Isostasy, Earthquakes (Causes and Effects) and Volcanoes.

**B. Geomorphology:**

Lithology and Landform; Weathering; Mass Wasting; Evolution of Slope; Hydrological Cycle; Run-off, Landform and Process (Fluvial, Glacial, Wind, Karst and Marine); Cyclic and Non-Cyclic concepts; Landscape Evolution, Geomorphic hazards.

**C. Geographical Thoughts:**

Approaches to Geographical Studies (Deterministic, Possibilistic, Quantitative Revolution, Welfare, Societal, Behavioral, Radical Schools, Functional, Structural, Materialistic, Ecological, Regional and Systematic); Concept of Space (Points, Distances, Interactions, Organization, Regions), Emergence of welfare geography.

**D. Climatology:**

Composition of the Atmosphere; Global Warming and possible consequences; Green House Effect, Elements and Factors of Climate; Insolation, Heat Belts; Pressure Belts; Planetary Wind System; Jet Stream; Humidity and precipitation; Cyclones and Anticyclones; Air mass; Monsoon; Thunderstorms; Climatic hazards, Climatic Classification — Koppen's and Thornthwait's schemes.

**E. Biogeography:**

Soils (Factors and Processes of Formation, Soil Profiles, Physical and Chemical Properties); World Soil Groups (Zonal, Azonal and Intra-Zonal; Soil Erosion and Conservation; Plants (Factors of Plant Growth, Major Types of Natural Vegetation and Environmental Relations); Forest Conservation, Social forestry, Biodiversity, Animal Communities.

**F. Environmental Geography:**

Ecosystem (Principles and Components, Energy Flow, Food Chain, Food Web and Bio-geochemical Cycles); Biomes (Concepts, Types and Ecological Adaptation); Environmental Degradation and Hazards, Management and Conservation; Meaning of Natural Environment; Man-Environment Relationship; Natural Regions and Environmental Adaptation of Human Life; Economy and Society.

**G. Economic Geography:**

Resources (Concept and Theories, Creating Factors and Processes, Classification, Utilization-processes, technology and environment quality); Economic Resources (Classification and Significance); Forms of Economy; Activity Components of Resource Utilization (Lumbering, Dairy Farming, Fishing, Mining, Power Generation; Agriculture and Industry), Models of Economic System; Theories of Location of Economic Activity, Ranking of World Economics, WTO and International trade, Economic disparity and social inequality; Sustainable development and impact of globalization.

**H. Human Geography:**

Population (Growth, Distribution, Age-Sex Composition, Occupational Resource; Characteristics of World's Human Resource; Theories of population growth, population

growth, food security, unemployment, work participation, gender issues, social well being. **I. Regional Geography of India:**

Relief; Drainage; Climate; Soil; Forest Resources; Mineral Resources, Power Resources; Irrigation; Agriculture, Industry; Population: Trade and Commerce, Transport, Basis of Regional Divisions of India (Physical and Economic), Concept, nature, type, scale and dimensions.

**J. Cartographic Techniques:**

Scale; Techniques of Data Representation; Map-Classification and Interpretation, Thematic Mapping, Principles and Methods of Projection, Elementary Surveying and Levelling (Principles and Methods with Chain, Compass, Dumpy Level and Theodolite); Common Statistical Techniques for Geographical Data Analysis, Aerial Photo and Satellite Imagery interpretation; Remote Sensing and GIS.

## COMPUTER SCIENCE (HONS/PG) [CODE-08]

### 1. Introduction and Background:

Generation of computers, Basic building blocks of Computer and their descriptions. Number system—Binary, Octal, and Hexadecimal, Fixed and floating point number representation, Different codes---BCD, Excess--- 3, Gray,ASCII, and EBCDIC, Binary arithmetic, Complement representations.

### 2 Digital logic:

Logic gates, Truth table, Minimization of Boolean expressions, Adder, Subtractor, Multiplexer, Encoder, Decoder, Flip Flops, Register, Counters.

### 3 Computer Organization:

CPU Organization with registers, Different addressing modes, Instruction formats, Hardwired and Micro programmed control units, Arithmetic algorithms related to arithmetic operations. Primary memory, Secondary memory Cache memory and Virtual memory, different I/o devices such as keyboard, Mouse, Dot matrix printer, Visual display unit.

### 4. Overview of programming:

Introduction to computer based problem solving, Algorithms--- time and space complexity analysis, Flow Chart, Pseudo code, Decision table, structured programming concepts, Programming languages classifications-machine, Assembling and high-level, Translators, Editors, Operating Systems---Multi programming, Multi tasking, Time sharing, Multi processing, Fundamental data Structure concepts--- Array Stack, Queue and linked lists.

### 5. Programming Languages:

BASIC, C,C++, Program design, Implementation of the primitive data structures, Object oriented concepts.

### 6. Overview of Software and Packages:

Utility commands in DOS, Windows and LINUX operating systems, Shell programming and application of batch files, File managements--- use of folders, and directory systems, Database programming for commercial applications using packages in star office and use of spreadsheet packages, Elements of word processing.

### 7. Computer Network:

Concept of networking, Client server concepts, E-mail, chat, internet, www, use of scripting language, html, Web page design etc.



## **HISTORY (HONS./PG) | CODE -13|**

- I. Feature of the Indus Valley Civilization - decline of the Indus Civilization-the Vedic Civilization - Sotas'a Mahajanapadas-Buddhism and Jainism - The rise and fall of the Maura Empire: Asoka's Dhamma - Imperial Guptas - Palas and Senas of Bengal.
- II. The establishment of the Delhi Sultanate-The Slave dynasty-the Khilji and Tughluq Rulers-The Khilji Revolution - The administrative structure under the Sultanate including provincial government-The problem of theocracy - the Vijayanagar Empire.
- III. Disintegration of the Sultanate - Babar - the importance of his invasion of India - Mughal - Afghan contest and Sher Shah Suri - Consolidation of the Mughal empire under Akbar - Territorial expansion under Akbar - Manasabdari System - Religious policy.
- IV. An overview of the reigns of Jahangir and Shahjahan - Aurangzeb's expansionist policies - conflict with the Marathas - Shivaji - The character of the Maratha Swarajya - Aurangzeb and the disintegration of the Mughal empire - The growth of regional powers, Bengal, Awadh, Hyderabad and the crisis of the empire in the early eighteenth century.
- V. Causes of the conflict between Siraj-ud-daula and the East India Company - Mir Kasim, private trade and the English East India Company - Brief Overview of British expansion - the Colonial Economy : Land revenue settlements - Drain of Wealth - Deindustrialization - Limited development of modern industries.
- VI. Early resistance to British rule - Paik, Chur & Poligar rebellions - Wahabi and Farazi movements - Santal Rebellion - The revolt of 1857; context and nature, Western Education and Social reform - Rammohan Ray, Young Bengal & Vidyasagar - Brahma Samaj and prarthana Samaj - Aligarh Movement: Early stages of Indian nationalism - pre-Congress associations - foundation of the Congress - the nature of the early Congress.
- VII. The rise of Extremism in Indian Policies - Anti-partition and Swadeshi movement - separate electorate and the British divide and rule policy: Gandhi and Indian nationalism - Non-Co-operation, Civil Disobedience, Quit India Movement: Muslim League and the demand for Pakistan - Partition and Independenc.
- VIII. The French Revolution of 1789 - Social context of the Revolution of Popular movement - the Reign of Terror: Robespierre - the rise of Napoleon Bonaparte - Napoleon's internal reconstruction - Napolean and Europe: Expansion and collapse of the Napoleonic empire.
- IX. The Vienna Congress (1815) - The Metternich System - The Revolutions of 1830 - 1848 - the new political ideologies : Nationalism, Liberalism and Socialism - the unification of Germany and Italy . Industrialization in England and Europe.
- X. European imperialism : Economic forces behind European Imperialism of the late 19th Century - colonialism and the Scramble for Africa - Germany's Welt Politik - Triple Alliance and Triple Entente - the origins of the First World War Peace settlement of 1919 - The Russian Revolution - Weimar Republic and the rise of Nazism in Germany - Fascism in Italy - Origins of the Second World War.

## **ISLAMIC HISTORY (H/PG)[Code-14]**

There shall be a paper of 60 marks. The Syllabus, and the pattern of questions shall be as follows:

Chapter I : Prophet to Pious Caliphs (570-661 A.D.)

Chapter II : The Umayyads (661-750 A.D.)

Chapter III : Socio- Cultural & Institutional History of the Abbasids (750- 1258 A.D.)

Chapter IV : Political and Administrative History of the Sultanate period.

Chapter V : Socio-Economic & Cultural History of the Sultanate period.

Chapter VI : Political and Administrative History of Mughal Period.

Chapter VII : Socio-Economic & Cultural Historyof the Mughal period.

Chapter VIII : Modern India with special reference to Muslim Politics Social, Political & Economic History  
(1757-1947)

Chapter IX :History of Bengal (1757-1947) : Social , Political & Economic History

Chapter X : History of Europe – Social , Political & Economic History (1784-1939)

## **MATHEMATICS (HONS./PG) [ CODE -15]**

### **A. CLASSICAL ALGEBRA:**

1. Integers: Statement of well ordering Principle, first and second principles of mathematical induction. Proofs of some simple mathematical results by induction. Divisibility of integers. The division algorithm. The greatest common divisor of two integers  $a$  and  $b$  - its existence and uniqueness. Relatively prime integers. Prime integers. Euclid's first theorem; if some prime  $p$  divides  $ab$ , then  $p$  divides  $a$  or  $b$ . Euclid's second theorem: there are infinitely many prime integers. Unique factorization theorem.
2. Complex numbers: Definition on the basis of ordered pairs. Algebra of complex numbers, Modulus, Amplitudes, Argand Diagram, De-Moivre's theorem and its applications, Exponential, Sine, Cosine and Logarithm of a complex number. Definition of  $a^z$  ( $a \neq 0$ ), Inverse Circular and Hyperbolic functions.
3. Polynomials with real coefficients: Fundamental theorem of classical algebra (statement only). The  $n$ th degree Polynomial equation has exactly  $n$  roots. Nature of roots of an equation (Surd and imaginary) roots occur in pairs. Statement of Descartes rule of signs and its applications. Multiple roots. Relation between roots and coefficients. Symmetric functions of roots. Transformation of equations. Reciprocal equations. Cardan's method of solving a cubic equation. Ferrari's method of solving a bi-quadratic equation.
4. Inequalities:  $A.M. \geq G.M. \geq H.M.$  and Cauchy's inequality - their simple and direct applications.

### **B. MODERN ALGEBRA**

1. Basic Concepts: Sets, subsets, equality of sets, operations on sets - Union, Intersection, Complements and Symmetric difference. Properties including De-Morgan's laws. Cartesian products, Binary relation from a set to a set (domain, range, Examples from  $R \times R$ ). Equivalence relation. Fundamental theorem on Equivalence relation. Partition, Relation of partial order. Congruence relation modulo  $n$  is an equivalence relation. Congruence classes. Mapping Injection, Surjection and Bijection. Inverse and Identity mapping. Composition of mappings and its associativity.
2. Introduction of Group Theory: Groupoid, Semi-group, Monoid, Group definition with both sided identity and inverses. Examples of finite and infinite groups taken from various branches. Additive (multiplicative) group of integers modulo an integer (resp. a prime). Klein's 4 group Integral powers of an element and laws of indices in a group. Order a group and order of an element of a group. Subgroups. Nee. And Suff. Condition for a subset of a group to be subgroup. Intersection and Union of two subgroups. Cosets and Lagrange's theorem. Cyclic groups -definition, examples and subgroups of cyclic groups. Generators Permutations. Cycle. Transposition. Even odd permutations. Symmetric group. Definition and order of Alternating subgroup. Normal subgroups of a group — Definition, examples and characterizations. Quotient group of a group by a normal subgroup. Homomorphism and

- Isomorphism of groups. Kernel of homomorphism. Fundamental theorem of homomorphism. An infinite cyclic group is isomorphic to  $(\mathbb{Z}, +)$  and a finite cyclic group of order  $n$  is isomorphic to the group of residue classes modulo  $n$ .
3. Introduction to rings and fields: Ring-definition and example. Ring of integers modulo  $n$ . Properties directly following from the definition. Integral domain and Field-Definitions and examples. Sub-ring sub-field & characteristic of a ring.

**C. MATRIX THEORY AND LINEAR ALGEBRA:**

1. Matrices of Real and Complex Numbers: Definition, examples, equality, addition, multiplication of matrices, Transpose of a matrix, Symmetric and Skew-symmetric matrices.
2. Determinants: Definition of a determinant of a square matrix, Basic properties, Minors and Cofactors, equations by Cramer's rule. Problems of determinants up to order 3.
3. Rank of a Matrix: Adjoint of a square matrix. For a square matrix  $A$  of order  $n$ ,  $A \cdot \text{Adj } A = \text{Adj } A \cdot A = \det A \cdot I$ . Singular, non-singular and invertible matrices. Elementary operations. Rank of matrix and its determination. Normal forms: Elementary matrices ; The normal form equivalence of matrices. Congruence of Matrices. Diagonalisation of matrices. Real quadratic form involving three variable. Reduction to Normal form.
4. Vector/ Linear Space Over a Field: Definition and example of vector space. Subspace. Union, Intersection and sum of vector spaces. Linear span. Generators and basis of a vector spaces. Formation of basis from linearly independent subset. Special emphasis of  $\mathbb{R}$ .
5. Row-space and column-space of a matrix: Definitions of row-space and column-space of a matrix. Row rank, column rank and Rank of a matrix.
6. System of Linear Equations: Solution space of a homogeneous system as a subspace. Condition for the existence of non-trivial solution of a system of linear homogeneous equations. Necessary and sufficient conditions for the consistency of a system of non-homogeneous equations. Solution of system of equations by matrix method.
7. Linear Transformation on Vector Spaces: Definition of linear transformation. Null space, Range space, Rank and Nullity of linear transformation. Sylvester's law of Nullity. (Inverse of linear transformation relative to ordered bases of finite dimensional vector spaces.)
8. Inner product space: Definition and examples. Norm. Euclidean Vector space Triangle inequality and Cauchy — Schwarz inequality in Euclidean vector space. Orthogonality of vectors. Orthonormal basis. Gram-Schmidt process of Orthonormalization.
9. Eigen value and Eigen vector, Characteristics equation of a square matrix. Caley-Hamilton's Theorem. Simple properties of Eigen values and Eigen vectors.

## II. REAL ANALYSIS

1. Real-Number: Geometric representation and Cantor, Dedekind Axiom. Salient properties taken as axioms Bounded set. Least upper bound axioms. Archimedean property. Decimal representation of real numbers.
2. Points Sets in  $\mathbb{R}^1$  and  $\mathbb{R}^2$ : Elementary properties and union of atmost denumerable sets. Denumerability of rational numbers and non-denumerability of real numbers and of an interval. Neighbourhood of a point, interior point, of linear point set, open and closed sets, limit point of a set in  $\mathbb{R}^1$  and  $\mathbb{R}^2$  concepts and simple properties. Union, intersection and complement of open and closed sets and Bolzano-Weiestrass theorem in  $\mathbb{R}^1$ . Covering by open intervals of linear point set, Lindeloff covering theorem and Heine Borel theorem (statements only) and compact sets in  $\mathbb{R}^1$ .
3. Real-valued functions defined on intervals: Bounded and monotonic functions. Limits, Algebra of limits. Sandwich rule, condition for the existence of a finite limit. Important limits like.

$$\frac{\sin X}{x}, \frac{\log(1+x)}{x}, e^{\frac{x-1}{x}} \text{ as } x \rightarrow 0 \text{ etc.}$$

4. Sequence of Points in One Dimension: Bounds, limits, convergence and divergence. Operation on limits. Sandwich rule. Monotone sequence. Nested interval therein. Cauchy's General Principle of convergence. Cauchy sequence, Limits of important sequence. Definition of e. Cauchy's first and second limit theorem. Subsequence.
5. Infinite Series of Constant Terms: Convergenence and divergenence. Cauchy's criterion. Abel-Pringsheim's Test. Tests (Comparison test, Root Test) convergence of series of non-negative terms. Series of arbitrary terms. Absolutely convergent and conditionally convergent series. Alternative series. Leibnitz test. Root and Ratio Tests. Non-absolute convergence — Abel's and Dirichlet's tests (statement and applications)
6. Continuity of a function at a point and on an interval: Continuity of some standard functions, continuity of composite functions. Piecewise continuous functions. Uniform continuity. Discontinuities of different kinds. Properties of continuous functions on a closed interval. Existence of inverse functions of a strictly monotone function and its continuity.
7. Concept of Differentiability and differential: Chain rule. Sign of derivative. Successive derivatives. Leibnitz theorem. Theorms on Derivatives : Darbox theorem, Rolle's theorem. Mean value theorems of Lagrange and Cauchy. Taylor's theorem. Maclaurin's series. Expansion of  $e^x$ ,  $a^x$ ,  $a > 0$ ,  $\log(1+x)$   $(1+x)^m$ ,  $\sin x$ ,  $\cos x$  etc. with their respective ranges of validity.
8. Indeterminate forms: L Hospital's rule and its consequences.
9. Maxima and Minima: Points of local extremum of a functions in an interval. Sufficient condition for the existence of a local maximum/minimum of a function at a point. Applications in Geometrical and Physical problems.
10. Tangents and Normals: Pedal equation, Peadal of a curve, Rectilinear Asympotes (Cartesian and parametric form). Curvature- radius and centre of

curvature. Chord of curvature. Curve-Tracing (familiarity with well-known curves).

11. Indefinite and Suitable Corresponding Definite integrals for the functions,  $\sin^m x$ ,  $\cos^n x$ ,  $\sin^n x$ ,  $\sin^m x$ ,  $\tan^n x$ ,  $\sec^n x$   $\cos^n x$

$$\cos^m x \cos^n x, \text{ etc. } \frac{I \cos x + m \sin x}{p \cos x + q \sin x}$$

$$\frac{1}{(a + \cos x)^n} \frac{1}{(n^2 + a^2)^n} \text{ where } 1, m, p, q, n \text{ are positive integers}$$

12. Area enclosed by a curve, length of a curve.
13. Sequence of functions : Pointwise and uniform convergence. Cauchy's criterion of uniform convergence. Limit function: Boundness, Repeated limits, continuity and differentiability.
14. Series of functions : Pointwise and uniform convergence. Tests of convergence statements of Abel's and Dirichlet's tests and their applications. Passage to the limit term-by-term; boundedness, continuity, integrability and differentiability of a series of functions in case of uniform convergence.
15. Power Series: Radius of convergence of its existence, Cauchy Hadamard theorem. Uniform and absolute convergence. Properties of sum function. Abel's limit theorems. Uniqueness of P. S. having the same sum function, Exponential. Logarithm and trigonometric functions defined by power series and deduction of their salient properties.
16. Riemann integration : Upper sum and lower sum. Upper and lower integral. Refinement of partitions and associated results. Darboux theorem. Necessary and sufficient condition of integrability. Integrability of sum, product, quotient and modulus. Integral on the limit of a sum. Integrability monotone function, continuous function and piece wise continuous function. Primitive, properties of definite integral, Fundamental theorem of integral calculus First and second mean-value theorem of integral calculus (statements and applications only).
17. Improper Integrants: Tests of convergence : comparison and r-test (statement only). Absolute and non-absolute convergence-corresponding test (statement only). Working knowledge of Beta and Gamma functions and their interrelations.
18. Functions of two variable: Limit, continuity, partial derivatives. Functions on  $R^2$  differentiability, differential. Chain rule. Euler's theorem, commutativity of partial derivatives statement of Schwarz and Young theorems.

### III. DIFFERENTIAL EQUATIONS

1. Significance of ordinary differential Equations: Geometrical and physical consideration. Formation of differential equation by elimination of arbitrary constants. Meaning of the solution of ordinary differential equation. Concepts of linear and non-linear differential equations.
2. Equations of first order and first degree: Statement of existence theorem. Separable, homogeneous and exact equations, condition of exactness, integrating factor. Equations reducible to first order linear equations.

3. First order linear equations: Integrating factor. Equations reducible to first order linear equations.
4. Equations of first order but not of first Degree: Clairaut's equation, singular solution.
5. Applications: Geometric applications, Orthogonal trajectories.
6. Higher order linear equations with constant coefficients: Complementary function. Particulars integral, Symbolic operator. D. Method of variation of parameters. Euler Equations — reduction to an equation of constant coefficients.

#### IV. ANALYTICAL GEOMETRY OF TWO AND THREE DIMENSIONS

##### A. TWO DIMENSIONS

1. Transformations of rectangular Axes: Translation, Rotation and their combinations. Theory of Invariants.
2. General Equations of Second Degree in two variables: Reduction to canon.
3. Pairs of straight lines: Condition that the general equation of second degree in two variables may represent two straight lines. Point of intersection of two intersecting straight lines. Angle between two lines given by  $ax^2 + 2hxy + by^2 = 0$  Angle bisectors. Equation of two lines joining the origin to the points in which a line meets a conic.
4. Circle, parabola, ellipse and hyperbola : Equations of pair of tangents from an external point, chord of contact, Poles and Polars. Conjugate point and conjugate line.
5. Polar Equations: Polar equations of straight lines, circles and conic referred to a focus as pole, Equations of tangent, normal and chord of contact.

##### B. THREE DIMENSIONS

1. Rectangular cartesian co-ordinate in space: half and octants concept of a geometric vector (directed line segment) projection of a vector on co-ordinate axis. Inclination of a projection of a vector on co-ordinate axis. Inclination of a projection of a vector on co-ordinate axis. Inclination of a vector with an axis. Co-ordinates of a vector. Direction cosine of a vector. Distance between two points. Division of a directed segment in a given ratio.
2. Equation of plane: General form, intercept and Normal forms. The signed distance of a point from a plane. Equation of a plane passing through the intersection of two planes. Angle between intersecting planes, Bisectors of angles between two intersecting planes. Parallelism and perpendicularity of two planes.
3. Straight lines in space: Equation (symmetric and parametric form) Direction ratio and Direction cosines. Canonical equation of the line of intersection to two intersecting planes. Angle between two lines. Distance of a point from a line. Condition of coplanarity of two lines. Equations of skewlines. Shortest distance between two skew lines.
4. Sphere: General equation, circle, sphere-through the intersection of two spheres. Radical Plane. Tangent, Normal.

5. General equation of 2nd degree in 3 variable. Reduction to canonical forms. Classification of quadrics.

### V. VECTOR ALGEBRA & ANALYSIS

1. Vector Algebra: Vector (directed line segment) Equality of two free vectors. Addition. Multiplication by a scalar. Position Vector: Point of division. Conditions of collinearity of 3 points and co planarity of 4 points. Rectangular components of a vector in two and three dimensions, product of two or more vectors: scalar and vector products, Scalar triple products and vector triple products. Products of four vectors.  
Direct applications of vector algebra in (i) Geometrical, trigonometrically problems, (ii) Work done by a force. Moment of a force about a point, vectorial equations of straight lines and planes. Volume of trahedron. Shortest distance between two skew lines.
2. Vector Analysis: Vector differentiation with reference to a sector variable. Vector functions of one scalar variable. Derivative of a vector. Second derivative of a vector. Derivatives of sums and products. Velocity and Acceleration as derivative.

### VI. MECHANICS - I

1. Composition and Resolution of coplanar concurrent forces. Resolution of forces. Moments and Couples.
2. Reduction of a system of coplanar forces. Conditions of equilibrium of coplanar forces.
3. Fundamental ideas and principles of Dynamics. Laws of motion. Impulse and impulsive forces. Work, power and energy, principles of conservation of energy and momentum.
4. Motion in a straight line under variable acceleration. Motion under inverse square law. Composition of two S. H. M's of nearly equal frequencies. Motion of a particle tied to one end of an elastic string. Rectilinear motion in a resisting medium. Damped forced oscillation. Motion under gravity where the resistance varies as some integral (nth) power of velocity.  
Terminal velocity.
5. Impact of elastic bodies. Newton's experimental law of elastic impact. Loss of K. E. in a direct impact.
6. Expressions for velocity and acceleration of a particle moving on a plane in Cartesian and Polar co-ordinates. Motion of a particle moving in a plane in Cartesian and Polar co-ordinate.
7. Central forces and central orbits. Characteristics of central orbits.
8. Tangential and Normal accelerations. Circular motions.
9. Motion of a particle in a plane under different laws of resistance. Motion of a projectile in a resisting medium in which the resistance varies the velocity.
10. Laws of friction, cone of friction. To find the positions of equilibrium of a particle lying on a (i) rough plane curve, (ii) rough surface under the action of any given forces.



11. General formula for the determination of centre of gravity.

### **VII LINEAR PROGRAMMING PROBLEM (L.P.P.)**

1. Definition of L.P.P. Formation of L.P.P. from daily life involving inequations. Graphical solution of L.P.P.
2. Basic solution and Basic Feasible solution (BFS) with reference to L.P.P. Matrix formulation of L.P.P. Degenerate and non-degenerate B.F.S. Hyperplane, convex set, Cone, Extreme points. Convex hull and convex polyhedron. Supporting and separating hyperplane. Simple results on convex sets like the collection of all feasible solutions of an L.P.P. constitutes a convex set. The extreme points of the convex set of feasible solutions correspond to its B. F.S. (no proof). The objective function has its optimal value at an extreme point of the convex polyhedron generated by the set of feasible solutions (no proof). Fundamental theorem (no proof). Reduction of a F.S. to a B.F.S.
3. Slack and Surplus variables. Standard form of L.P.P. theory of simplex method. Feasibility and optimality conditions.
4. The algorithm. Two phase method. Degeneracy in L.P.P. and its resolution.
5. Duality Theory: The dual of the dual to the Primal. Relation between the objective values of dual and the primal problems. Relation between their optimal values. Complementary slackness. Duality and simplex method and their applications.
6. Transportation and Assignment problems, and their optimal solution.

### **VIII. MECHANICS - II**

1. Laws of friction, cone of friction. To find the positions of equilibrium of a particle lying on a (a) rough plane curve, (ii) rough surface under the action of any given forces.
2. General formula for the determination of centre of gravity.
3. Astatic equilibrium, Astatic Centre. Positions of equilibrium of a Particle lying on a smooth plane curve under action of given forces.
4. Virtual work: Principle of virtual work for a single particle. Deduction of the conditions of equilibrium of a particle under coplanar forces from the principle of virtual work. The principle of virtual work for a rigid body. Forces which do not appear in the equation of virtual work. Forces which appear in the equation of virtual work. The principle of virtual work for any system of coplanar force acting on a rigid body. Converse of principle of virtual work.
5. Forces in 3-dim: Moment of a force about a line. Axis of couple. Resultant of any number of couples acting on a rigid body. Reduction of a system of forces acting on a rigid body. Poinsot's Central axis. Wrench, Pitch, Intensity and screw. Invariant and equation of the central axis of a given system of forces.
6. Motions under inverse square law in a plane. Escape velocity. Planetary motions and Kepler's Laws. Artificial satellite Motion. Slightly disturbed orbit. Conservative field of force and principles of conservation of energy, Motion under rough curve (circle, parabola, ellipse, Cycloid) under gravity.

7. RIGID DYNAMICS :

Moments and products of inertia. Theorem of parallel and perpendicular axes. Principles axes of inertia, momental ellipsoid Equipomental system. D'Alembert's principle. Equation of Motion. Principles of moments. Principle of conservation of linear and angular momentum. Principles of energy. Equation of Motion of a rigid body about a fixed axis. Expression for K.E. and moment of momentum of a rigid body moving about a fixed axis. Compound pendulum. Equation of Motion of a rigid body moving in 2-dim. Expression for K. E. and angular momentum about the origin of a rigid body moving in 2 dim. Motion of a solid revolution moving on a rough horizontal & inclined plane.. Conditions for pure rolling. Impulsive action. Generalised coordinates, momentum. Lagrangian, Cyclic coordinates, Routhian.

**IX. A. MATHEMATICAL THEORY OF PROBABILITY**

Random experiments. Simple and compound events. Event space. Classical and frequency definitions of probability and their drawbacks. Axioms of probability, Statistical regularity. Multiplication rule of probabilities. Bayes theorem. Independent events. Independent random experiments. Independent trials. Bernoulli trails and law. Multinomial law. Random variables, Probability distribution. Distribution function, discrete and continuous distributions. Binomial, Poisson, Uniform, normal distribution. Cauchy gamma distributions. Beta distribution of the first and of the second kind. Poisson process. Transformation of random variables. Two-dim, prob. Distribution. Discrete and continuous distributions in two dimensions. Uniform distributions, and two-dimensional normal distribution. Conditional distributions. Transformation of random variables in two dimensions. Mathematical expectation. Mean, variance, moment, central moments. Measures of location, dispersion, skewness and Kurtosis. Median, Mode, quartiles, Moment-generating function characteristic function. Two dimensional expectation. Covariance. Co-relation Co-efficient. Joint characteristic function. Multiplication rule for expectations, conditional expectations, Regression curves, least square regression lines and parabolas. Chi square and distributions and their important properties, inequality Convergence in probability. Bernoulli's limit theorem. Law of large numbers. Poisson's approximation to binomial distribution. Normal approximation to binomial distribution. Concept of asymptotically normal distributions. Statement of central limit theorem in the case of equal components and of limit theorem for characteristic functions and in applications. (Stress should be more on distributive function theory than on combinational problems. Different combinatorial problems should be avoided).

**B. MATHEMATICAL STATISTICS:**

Random samples. Distribution of the sample. Tables and graphical representations. Grouping of data. Sample characteristic and their computation. Sampling distribution of a statistic. Estimates of a population characteristic or parameter.

Unbiased consistent estimates. Sample characteristics as estimates of the corresponding population characteristics. Sampling distributions of the sample mean and variance. Exact sampling distributions for the normal populations. Bivariate samples. Scatter diagram. Sample correlation coefficient. Least square regression lines and parabolas. Estimation of parameters. Method of maximum likelihood. Applications to binomial. Normal populations. Confidence intervals. Such intervals for the parameters of the normal populations. Approximate confidence interval for the parameter of a binomial population. Statistical hypothesis. Simple and composite hypothesis. Best critical region of a test. Neyman Pearson theorem and its applications to normal populations. Likelihood ratio testing and its applications to normal population.

## **X. NUMERICAL ANALYSIS**

1. Computational Errors : Round-off errors, significant digits, errors in arithmetical operations, guard figures in calculations.
2. Interpolation : Polynomial Interpolation, remainder, Equally-spaced interpolating points-difference, difference table, propagation of errors; Newton's forward and backward, Stirling and Bessel interpolation formulae, divided differences, divided difference, formula, confluent divided differences, inverse interpolation.
3. Numerical Differentiation : Error in numerical differentiation. Newton's forward and backward and Lagrange's numerical differentiation formula.
4. Numerical Integration : Degree of precision, open & closed formulae, composite rules. Newton-Cotes (closed-type) formula — Trapezoidal, Simpson's one third and Weddle's rules, error formulae in terms of ordinates (proofs not necessary).
5. Numerical Solutions of Equations: Initial approximation by methods of tabulation and graph, methods of bisection, fixed point iteration with condition of convergence. Newton . Raphson & Regula-falsi methods, computable estimate of the error in each method.
6. Solution of ODE:  
First Order First degree: By Euler, RK4 and Milne's method.

## **NUTRITION (HONS./PG) [ CODE -16]**

### **1. Nutrition for Health & Growth: Meal Planning to Meet Recommended**

#### **Allowances**

Nutrition to-day. Basic Meal Pattern and its Modification to suit different. Income Lev-els, Age and Physiological State. Community Nutrition Programme. Role of the Dietitian in the Community. Estimation of Human Dietary Needs. Calorie Allowances. Interpretation and use of Tables. Meal Planning to Fit Personal & Family Needs. Menus and Market Order for a family of Four. Economy Hints. Regional, National and Cultural Food Patterns.

### **2. Diet in the Treatment of Disease/ Therapeutic Diet**

The Hospital Basic Diet. Progressive House Diets. Dietary Modifications for specific conditions. Nutritional Adequacy of Hospital Diets. Basic concept and Methods of (i) Oral Feeding (ii) Tube Feeding (iii) Parenteral Nutrition (iv) Intravenous Feeding. Diet During Febrile Condition, Infection & Surgical Condition. Role of Dietitian in the Hospital. Patient Check-up and counselling education of the patient follow up. Relation between Nutrition and Infection.

### **3. Nutrition in Pregnancy & Lactation**

Nutritional demands of Pregnancy. Food selection in Pregnancy. Complications of Pregnancy involving diet. Diet during Labour Diet following delivery. Diet in Lactation.

### **4. Nutrition during Infancy**

Breast Feeding. Formula Feeding. Digestive disturbances of Infancy. Weaning. Formulas: Types and Preparation. Supplementary Foods. The Infant Diet. Weight Gain.

### **5. Nutrition for Growth**

Diet in Early Childhood. Elementary School Age. High School Age. Nutrition studies of Children. The School Lunch Programme. Nutritional Education.

Evaluation of Growth & Nutritional Status.

### **6. Geriatric Nutrition**

Adult Nutrition. Our aging Population. Food habits of Older People. Food requirements of Older People. Planning Meals for Older people.

### **7. Nutrition of Athletes**

Nutrition Requirement. Meal Planning.

### **8. Diseases of Gastro-intestinal Tract, Liver and Biliary Diet**

The pathway of Digestion. Diagnostic Procedures. Peptic Ulcer, Gastritis, Diarrhoea, Colitis. Constipation. Flatulence. Dietary Modification in the Above Diseases.

### **9. Diseases of the Kidneys**

Functions of Kidney. Nephritis. Glomerulonephritis. Uremia. Kidney Failure. Nephrosis. Therapeutic Diet.

### **10. Dietary Therapy in**

(a) Diabetes Mellitus & Obesity, (b) Cardiovascular Diseases : Hyperlipidemia Athero-sclerosis Hypertension.

## PHILOSOPHY (HONS./PG) [ CODE -18]

### Group - A (INDIAN PHILOSOPHY)

1. **GENERAL FEATURES OF INDIAN PHILOSOPHY**
  2. **CARVAKA:**
    - (a) Epistemology.
    - (b) Metaphysics.
    - (c) Ethics.
  3. **JAINISM**
    - (a) Anekantavada, (b) Syadvada, (c) Jaina theory of self and liberation
  4. **BUDDHISM**
    - (a) Four noble truths, (b) Pratityasamutpada, (c) Nairatmyavada, (d) Ksanabhangavada, (e) Four schools of Buddhism.
  5. **NYAYA-VAISESIKA**
    - (a) Nyaya epistemology
    - (b) Nyaya theory of God
    - (c) Nyaya theory of soul
    - (d) Vaisesika metaphysics:
      - (i) Categories of reality (Padartha).
      - (ii) Dravya - Definition of dravya and its different kinds.
      - (iii) Guna - Definition of guna and a short account of its different kinds.
      - (iv) Karma - Definition and a short account of its different kinds.
      - (v) Samanya - Definition of samanya. Samanya and jati, upadhi and jati.

Arguments for accepting samanya as a padartha. Classification of samanya. Jatibadhakas. (vi)

Visesa-Definition of visesa.

Arguments for accepting visesa as a separate category.
    - (vii) Samavaya - Definition of samavaya.

Distinction between samyoga and samavaya.  
Distinction between samavaya and svarup-sambandha.  
Arguments for accepting samavaya as a category .  
Arguments for accepting samavaya as one and eternal. (viii) Abhava -  
Justification for accepting abhava as a separate category of reality.  
Refutation of the Prabhakara view that abhava is non-different from its locus.  
Different kinds of abhava.
6. **SAMKHYA AND YOGA**
  - (a) Samkhya theory of causation (satkaryavada); different forms of satkaryavada.
  - (b) Samkhya theory of Prakrti.
  - (c) Samkhya conception of Guna.
  - (d) Relation between Prakrti and Gunas.
  - (e) Proofs for the existence of prakrti.
  - (f) Samkhya theory of Purusa; proofs for the existence; of purusa Doctrine of plurality of selves.

- (g) Theory of evolution (after Vacaspati's commentary).
  - (h) Samkhya theory of liberation - jivanmukti and videhamukti.
  - (i) Yoga conception of God.
  - (j) Cittabhumi and Cittavrtti.
  - (k) Eight - fold means of Yoga.
  - (l) Samadhi - its different types.
- 7. MIMAMSA (PRABHAKARA AND BHATTA)**
- (a) Arthapatti and Anupalabdhi as sources of valid knowledge.
  - (b) Pramanyavada in respect of origin of knowledge and knowledge of knowledge.
- 8. VEDANTA (SAMKARA AND RAMANUJA)**
- (a) Nature of Brahman, according to Samkara.
  - (b) Saguna Brahman and nirguna Brahman, according to Samkara.
  - (c) Relation between Brahman and the world (Jagat) according to Samkara.
  - (d) Samkara's doctrine of Maya
  - (e) Ramanuja's criticism of Samkara's doctrine of Maya
  - (f) The Advaita theory of liberation - Jivanmukti and videhamukti
  - (g) Ramajuja's theory of Brahman
  - (h) Relation between Jiva and Brahman, according to Ramanuja

#### **Group-B (ETHICS)**

- (1) The Nature of Ethics Moral and
- (2) Non-moral Action The Nature of
- (3) Moral Judgement Object of
- (4) Moral Judgement Postulates of
- (5) Morality Theories of
- (6) Punishment Standard's of
- (7) Morality

#### **Hedonism:**

- (a) Psychological and Ethical, (b) Egoistic Hedonism, (c) Gross Egoistic Hedonism, (d) Refined Egoistic Hedonism (e) Altruistic Hedonism - Bent ham's Theory, Mill's Utilitarianism, (g) Act. Utilitarianism and Rule. Utilitarianism.
- 9. Deontological Theories**
- Act - Deontological Theories
  - Rule - Deontological Theories
  - Kant's Theory
- 10. Practical Ethics**
- (i) The concept of Practical Ethics
  - (ii) Euthanasia
  - (iii) Killing Animals
  - (iv) Environmental Ethics

**Group - C (HISTORY OF WESTERN PHILOSOPHY)**

- Plato : (a) Theory of Knowledge.  
 (b) Theory of Forms,
- Aristotle: (a) Doctrine of Causality,  
 (b) Theory of Substance,  
 (c) Matter and Form,  
 (d) Criticism of Plato's Theory of Forms
- Descartes: (a) Cartesian Method,  
 (b) Cartesian Method of Doubt,  
 (c) Cogito ergo sum,  
 (d) Criterion of Truth,  
 (e) Theory of Ideas,  
 (f) Proofs for the Existence of God,  
 (g) Doctrine of Substance,  
 (h) Mind-Body Relation,  
 (i) Proof of the External
- World, Spinoza: (a) Doctrine of Substance,  
 (b) Relation between Substance and Attributes,  
 (c) Doctrine of Modes,  
 (d) Theory of Knowledge,  
 (e) Mind - Body Relation,  
 (f) Conception of Freedom; Intellectual Love of God.
- Leibnitz: Doctrine of Monads: Truths of Reason of Truths of Fact; The Principles of Non-Contradiction, Sufficient Reason and the Identity of Indiscernibles; The Doctrine of Pre-established Harmony; Theory of Knowledge. Problem of Evil.
- Locke: Refutation of Innate Ideas and Principles; Theory of Ideas: Distinction between Primary and Secondary Qualities. Theory of Knowledge.
- Berkeley: Rejection of Materialism; Criticism of Abstract Ideas; Rejection of the Distinction between Primary and Secondary Qualities; Esse est Percipi; Role of God in Berkeley's Philosophy.
- Hume: Distinction between Impressions and Ideas; Relation of Ideas and Matters of Facts; Causality; Self, Scepticism.
- Kant: Apriori and Empirical Knowledge; Analytic and Synthetic Judgement; Synthetic Apriori Judgement-Kant's Problem; Copernican Revolution in Philosophy; Space and Time; Categories of the Understanding.

**Group -D (PSYCHOLOGY)**

- Methods of Psychology: Introspection: Extrospection; Experimental Method.
- Sensation: Definition; Attributes of Sensation; Weber-Fechner Law.
- Perception: Definition; Distinction between Sensation and Perception; Gestalt Theory of Perception.

Memory: Factors of Memory: Marks of Good Memory: Laws of Association. Causes of Forgetfulness.

Attention: Nature, Condition and Span of Attention: Division of Attention. Learning: Theories of Learning- Trial and Error Theory; Pavlov's Conditioned Response Theory: Gestalt Theory.

Instinct: Biological Theory; Psychological Theory.

Consciousness: Levels of Consciousness; Proofs for the Existence of the Unconscious; Freud's Theory of Dream. Intelligence: Definition; Measurement of Intelligence;

I.Q. Binet - Simon Test of Intelligence; Terman Merrill and Wechsler Test of Intelligence. Theories of Intelligence: Unifactor; Two-Factor (Spearman's Theory); Multifactor Theory.

### **Group - E (SOCIAL AND POLITICAL PHILOSOPHY)**

- (1) Categorical Propositions and Classes: Quality, Quantity and Distribution of Terms; Translating Categorical Propositions into Standard form.
- (2) Immediate Inference: Conversion, Obversion, Contraposition: Square of Opposition; Determination of the truth-value of a proposition, given the truth-value of another proposition.
- (3) Categorical Syllogism: General Rules and Fallacies; Solving Problems and Proving Theorems concerning Syllogism.
- (4) Boolean Interpretation of Categorical Propositions, Venn Diagrammatic Representation of Categorical Propositions. Use of Venn Diagram to Test Arguments for validity; Review of the Traditional Laws of Logic concerning Immediate Inference and Syllogism: hypothetical and Disjunctive Syllogism: Dilemma.
- (5) Truth Functions: Negation, Conjunction, Disjunction, Conditional, Biconditional. Testing Argument-forms and Arguments for validity by applying (a) Truth-table Method, (b) Method of Resolution, (c) Shorter Truth-table Technique-Reductio Ad Absurdum. Testing Statement/Statement-form for Validity of Truth-table Method and method of Resolution. Proving invalidity, to Construct Formal Proof of Validity.
- (6) Quantification: Translating Sentences into Quantificational Language: Quantification Rules . UI, EI, UG EG. To Construct Formal Proof of Validity of Arguments involving Monadic Quantification, To Prove invalidity of Arguments involving Monadic Quantification.
- (7) Analogy and Probable Inference: Induction by Simple Enumeration; Analogical Argument; Appraising Analogical Arguments.
- (8) Causal Connection and Mill's Methods of Experimental Enquiry. The Meaning of Cause; Doctrine of Plurality of Causes: Method of Agreement; Method of Difference; Joint Method of Agreement and Difference; Method of Concomitant Variation; Method of Residues. Criticisms of Mill's Methods; Vindication of Mill's Methods.
- (9) Hypothesis: Distinction between Scientific and Unscientific Explanation; Criteria for appraising Scientific Explanation.



## **PHYSICS (HONS./PG) [ CODE -17]**

### **MECHANICS AND GENERAL PROPERTIES OF MATTER**

Scalars and Vectors, unit vector, addition and subtraction of vectors (analytical method), product of two vectors, vector analysis, Matrices. Mechanics of single particle and a system of particles, Lagrangian and Hamiltonian formulation. Angular momentum, Conservation of angular momentum. Moment of inertia, radius of gyration. Theorem of parallel and perpendicular axes. Centripetal force and centrifugal force.

Relation between  $G$  and  $g$ , variation of  $g$ , Gravitational potential intensity at a point due to spherical and other symmetrical bodies, Kepler's laws of planetary motion. . Elastic deformations, Torsion of wire, Torsional Oscillation. Bending of uniform beam, clamped at one end supported at both ends.

Surface tension and its molecular origin, surface energy. Excess pressure on a curved liquid surface, shape of liquid drops, surface tension and evaporation.

Coefficient of viscosity. Viscous flow through a capillary tube. Poiseuille's formula. Stokes law, Reynold number. **HEAT**

1. Kinetic theory of Gases — Basic assumptions of the theory, perfect gas equation. Temperature; Degrees of freedom; classical law of distribution of energy; specific heat of gases, Ratio of specific heats at constant pressure and at constant volume. Absolute scale of temperature.
2. Deviation from perfect gas equation, vander Wall's equation of State. Critical constants.
3. Heat conduction in Solid, conductivity and diffusivity.
4. First Law of thermodynamics.  
Second Law of thermodynamics, Reversible and irreversible processes.  
Condition of reversibility. Carnot's theorem. Kelvin temperature scale. Heat engines.  
Entropy concept. Entropy of an ideal gas, Entropy of a mixture of gases.  
Entropy change in reversible and irreversible processes, principle of increase of entropy.
5. Throttling process, Joule Thomson effect, liquefaction of gases - critical phenomena.

### **SOUND (OSCILLATION AND WAVES)**

1. Simple harmonic Motion. Superposition of two harmonic oscillations with constant phase, frequency and amplitude difference beat phenomenon, coupled vibration.
2. Damped harmonic oscillator, Q-factor, Forced vibration. Resonance, sharpness of resonance. An harmonic oscillation.
3. Waves in continuous medium, Elastic waves in solids, liquids and gases, phase and group velocity. Energy transport by a traveling wave. Energy flux in a sound wave. Relative and absolute intensity. Decibel and phne; standing wave.
4. Transverse vibration of strings.
5. Doppler effect in sound, ultrasonics.

### **OPTICS**

1. Short wave-length limit and geometrical optics, Fermat's Principle and its application to reflection and refraction at plane surfaces, combination of lenses: equivalent lens. Thick lenses, Principal plane, Nodal points. Helmholtz-Lagrange law for magnification.

2. Aberrations - spherical aberration, causes and remedy. Qualitative ideas of astigmatism, distortion, chromatic aberration.
3. Ramsden and Huygens's eye pieces (Ray diagram), Angular magnification. Resolving power (no deduction).
4. Electromagnetic nature of light. Electromagnetic spectrum. Huygens's principle.
5. Interference of light, Coherent and incoherent sources. Interference by division of wave front and division of amplitude. Different types of interferometer (Principle only) Resolving power, Michelson and Fabry Perot interferometer.
6. Fresnel diffraction. Division of wave front into half period zones, zone plate. Plane diffraction grating. Resolving power, and dispersive power of a plane diffraction grating (Deduction not necessary).
7. Polarization: Biaxial and uniaxial crystals, ordinary and extra-ordinary rays. Half and quarter wave plates. Optical activity. Faraday effect, Kerr effect.

### **MAGNETISM, ELECTROSTATICS AND CURRENT ELECTRICITY**

1. Magnetic potential and fields due to short magnet and magnetic shell.
2. Intensity of magnetization, moment of a magnet, magnetic saturation, permeability and susceptibility, Dia, Para and Ferro magnetism, Hysteresis.
3. Couple on a magnet in a uniform field, work done in deflecting a magnet, magnetic needle in two cross magnetic fields.
4. Electric potential and electric intensity. Potential and intensity at a point due to charge. Electrostatic induction, lines of forces, distribution of charge and potential on a surface. Equipotential surface, total normal induction, Gauss theorem and its applications. Coulomb's theorem and its applications. Mechanical force on a charged surface, energy per unit volume of a medium. Capacity of conductor and factors controlling it, energy of a charge; Multiple expansion.
5. Electric polarization and dipole, electric displacement, dielectric constant, Capacitance of common condenser (spherical, parallel plate and cylindrical).
6. Magnetic effect of electric current, Laplace's equation, Biot Savart law, Ampere's theorem. Magnetic field on the axis of a circular coil, solenoid, field due to a current in an infinitely long wire; effect of magnetic field on current carrying conductors; Moving coil Galvanometer, ammeter and voltmeter.
7. Kirchhoff's laws and its application, Seebeck, Peltier and Thomson effect, Thermo electric power, Thermo couple.
8. Self and Mutual inductances, Varying currents, Growth and decay of currents in L-R circuit. Charging and discharging of a condenser in C-R circuit. Time constant and log decrement.
9. R.M.S. and mean values of alternating current. Reactance and impedance, phase angle. Power in a.c. circuits. LR, CR and LCR circuits series and parallel resonant circuits; Q-factor.

### **MODERN PHYSICS**

1. X-rays, production and nature, Compton effect, Mosley's law, Rutherford model Bohr model of atoms. Pauli Principle, photo electric effect.
2. Planck hypothesis, deBroglie hypothesis, Schrodinger equation, eigenvalues and eigenstates, Orthonormalization, expectation value, commutation relation and measurement, particle in a box. Linear harmonic oscillator. Potential well and barrier problems.

3. Hydrogen atom, angular momentum, spherical harmonics, parity, atomic spectra, time independent perturbation method. Two electron atom, spin-orbit interaction, sodium D-lines, Zeeman and Stark effect.
4. Molecular spectra, vibration and rotation, Raman effect, selection rules, symmetry.
5. Crystal structure, direct and reciprocal lattice, lattice vibration, s=acoustic and optical modes, band theory, Kronig Penny model, Metal, semiconductor and insulator, Hall effect.
6. Statistical Mechanics, ensemble, canonical and grand canonical ensemble, Bose Einstein and Fermi Dirac statistics, Bose Einstein condensation.
7. Nuclear Physics, nuclear spin and nuclear magnetic moment, nuclear radius mass and binding energy, stability condition, Nuclear disintegration, short range interaction, Yukawa model, elementary particles, baryons and leptons.
8. Lasers, coherence properties, applications, He-Ne Laser, optical fiber.
9. Relativity, Lorentz transformation, four-vector, Energy-mass relations.

#### **ELECTRONICS AND INSTRUMENTATION:**

1. Diodes, p-n junction, zener diode, rectification.
2. Transistors: Bipolar junction transistor, hybrid parameters, CB, CC and CE configurations, amplifiers.
3. Boolean algebra, Logic gates, AND, OR, NOT, NAND AND NOR gates.
4. Vacuum techniques, production and measurement
5. Particle accelerators and detectors.

## **POLITICAL SCIENCE (HONS./PG) [ CODE -19]**

### **Group - A**

#### **1. Introduction:**

- (i) Definition, Nature and Scope of Political Science
- (ii) Relations with History, Economics, Philosophy and Sociology
- (iii) Meaning of "Politics" and "Political"

#### **2. Approaches:**

- (i) Traditional approach: Basic Tenets Historical, Philosophical and Legal approaches,
- (ii) Behavioural approach: Basic Tenets -Concepts of Power, Process and Quantification, (iii) Post-behavioural critique of Behaviouralism.
- (iv) Marxian approach: Basic Tenets - Dialectical Materialism. Materialist Interpretation of History. Base-Superstructure. Class and Class-struggle.

#### **3. State:**

- (i) Definition, (ii) Characteristic, (iii) State and other Associations.

#### **4. Origin of the State:**

- (i) Social Contract Theory of Hobbes, Locke and Rousseau-concepts of-
- (a) State of Nature (b) Social Contract (c) Sovereignty (d) Individual Liberty-Value of the Theory.
- (ii) Evolutionary Theory-Value of the theory
- (iii) Marxian theory -From Primitive Communism to emergence of classes and formation of State.

#### **5. Nature of the State:**

- (i) Idealist theory-Hegel and Green, (ii) Marxian Theory-Engels and V.I. Lenin (iii) Gandhian Theory-Concepts of Trusteeship and Sarvoday.

#### **6. Political System:**

System theory (David Easton) and Structural-Functional Theory (Almond & Powell).

#### **7. Functions of State:**

- (i) Individualist Theory: Herbert Spencer, John Stuart Mill.
- (ii) Socialist Theory: (a) Guild Socialism (b) Syndicalism (c) Scientific Socialism.
- (iii) Theory of Welfare State.

#### **8. Sovereignty:**

- (i) Definition and characteristics, (ii) De Jure and De Facto, (iii) Monistic Theory of Sovereignty, (iv) Pluralistic Theory of Sovereignty (v) Popular Sovereignty (vi) Internal and external limitations of Sovereignty.

#### **9. Nationality, Nationalism and Nations:**

- (i) Definitions of the terms.
- (ii) Concepts of (a) Right of Self-determination of Nations,
- (b) Internationalism, (c) Globalisation.

#### **10. Citizenship:**

(i) Definition, (ii) Acquisition or Loss of Citizenship, (iii) Difference between Natural and Naturalised citizen.

#### **11. Rights and Duties:**

- (i) Definition
- (ii) Types of Rights - Civil, Economic, Political (including right to resistance) and Social (with special reference to Gender- equality).

12. **Liberty:**  
(i) Definition of the concept, (ii) Relation between Liberty and Equality, (iii) Safeguards of Liberty in modern States.
13. **Democracy:**  
(i) Democracy as an ideal, (ii) Democracy as a form of Governance, (iii) Representative Democracy and Participatory Democracy.
14. **Totalitarianism:**  
(i) Definition and characteristics, (ii) Fascism as a form of Totalitarianism.
15. **Public Opinion:**  
(i) Definition, (ii) Different Media, (iii) Role and Importance.
16. **Political Party:**  
(i) Definition, (ii) Function, (iii) Definition of Party System, (iv) Types of Party System.  
(a) Single Party System (b) Bi-Party System (c) Multi-Party System (d) Dominant Party System.
17. **Pressure Groups:**  
(i) Definition (ii) Difference with Political Party, (iii) Functions.
18. **Representation:**  
(i) Definition, (ii) Methods of Representation - (a) Territorial (b) Functional (c) Proportional  
(iii) Adult Franchise-Arguments for and against.
19. **Ideologies:**  
(i) Liberalism (ii) Democratic Socialism.
20. **Law:**  
(i) Definition, (ii) Sources of Law.

#### **Group - B**

1. **Constitution:**  
(i) Definition, (ii) Classification  
(iii) Difference between (a) Constitution and Convention, (b) Convention and Custom, (c) Convention and Law, (d) Constitution and Law.
2. **Forms of Government:**  
(i) Features of Cabinet form of Government, (ii) Features of Federal Government (iii) Difference between Federation and Confederation.
3. **Preamble to the Indian Constitution:**  
(i) Definition (ii) Significance.
4. **Indian Federation:**  
(i) Nature of Indian Federalism, (ii) Difference with American Federalism (iii) Growth and development of Regionalism in India, (iv) Concept of Cooperative federalism. 5.
- Fundamental Rights and Duties in Indian Constitution:**  
(i) Different types of Fundamental Rights-description, significance and limitations, (ii) Fundamental Duties-significance.
6. **Directive Principles of State Policy in Indian Constitution:**  
(i) Description of the Principles (ii) Constitutional Status and Importance.
7. **President of India:**  
(i) Position, (ii) Functions, (iii) Comparison with American President and the President of Peoples' Republic of China.
8. **Prime Minister of India:**  
(i) Position (ii) Functions (iii) Role, (iv) Comparison with British Prime Minister and the Prime Minister of Peoples' Republic of China.

9. **State Executive:**
  - (i) Role of Governor in the administration of a State.
  - (ii) Powers and Position of Chief Minister
10. **Indian Parliament:**
  - (i) Composition, (ii) Nature of Parliamentary Sovereignty in India
  - (iii) Comparison with British Parliament (iv) Relations between the two Houses (Lok Sabha and Rajya Sabha) (v) Role of Speaker of Lok-Sabha-Comparison with that in British Parliament, (vi) Parliamentary control over Executive in India, Britain, U.S.A. and Peoples' Republic of China. (vii) Definition of (a) Money Bill and (b) Budget
  - (ix) Functions of (a) Public Accounts Committee and (b) Estimates Committee in Indian Parliament.
11. **Indian Judicial System:**
  - (i) Difference with American Judicial System, (ii) Composition and functions of the Supreme Court of India, (iii) Judicial Review in India and USA, (iv) Meaning of Judicial Activism (v) Recent trends of Judicial Activism in India.
12. **Amendment procedure of Indian Constitution:**
  - (i) Procedure, (ii) Comparison with U.S. Constitution and the Constitution of Peoples' Republic of China.
13. **Election Commission of India:**
  - (i) Comparison and functions of the Election Commission
  - (ii) The role of the Chief Election Commissioner.
14. **Scheduled Castes and Scheduled Tribes, Minorities and Anglo Indians:**

Special Provisions in the Constitution of India for the Scheduled Castes, Scheduled Tribes, Anglo-Indians and Minorities.
15. **Planning Process in India:**
  - (i) Composition and functions of Planning Commission of India.
  - (ii) Composition and functions of National Development Council.
  - (iii) Composition and functions of State Planning Board of West Bengal.
  - (iv) Composition and functions of District Planning Committees of West Bengal.
16. **District Administration:**

Role of (i) District Magistrates, (ii) Sub-divisional Officers, (iii) Block Development Officers.
17. **Panchayati-Raj in West Bengal:**

Structure and Functions of (a) Zilla Parishad, (b) Panchayat Samiti (c) Gram Panchayat.
18. **Municipal Administration in West Bengal:**
  - (i) Structure and Functions of Calcutta Municipal Corporation (ii) Structure and Functions of Municipalities in West Bengal.

### Group-C

1. **International Law:**
  - (i) Definition of International Law, (ii) Nature of International Law.
2. **International Organisation:**
  - (i) Origin of the United Nations, (ii) Aims and Objectives of U.N. (iii) Composition and functions of (a) General Assembly, (b) Security Council, (c) Secretariate-the role and importance of the Secretary General (d) Economic and Social Council, (e) International Court of Justice (f) Specialised Agencies.

## **SOCIOLOGY (HONS/PG) | CODE -21|**

The five broad areas are: Sociological Thought, Sociological Theory, General Sociology, Research Methods and Indian Society.

### **Sociological Thought**

- Comte : Positivism, Social Statics & Social Dynamics, Hierarchy of Sciences, Law of Three Stages.
- Spencer : Organicism, Social Evolution, Typology of Societies.
- Durkheim : Methodology, Division of Labour, Suicide, Religion, Social Fact.
- Weber : Methodology, Social Action, Authority, Rationality, Protestant ethic and capitalism
- Marx : Methodology, Class, Class struggle & Revolution, Alienation, Stages of Social Development, State.
- Pareto : Logical and non-logical action, Residues and Derivations. Circulation of Elite.

### **Sociological Theory**

Nature and task of theory, Macro and Micro-Sociology, Research and Theory.

### **Functional Theory**

General Proposition, parsons' Social System theory, Merton's Middle Range theory, General criticisms.

### **Conflict Theory**

General Propositions, Dahrendorf's Dahrendorf's Dialectical Analysis, Coser's Functionalist Analysis, General Criticisms.

### **Exchange Theory**

General Propositions, Homans' Principle of Exchange, Blau's Structuralism, General criticisms.

### **Symbolic Interactionism**

General Propositions, Mead's analysis of Self & Society, Blumer's theory.

### **General Sociology**

Issues & Concepts, Sociology's distinctive perspective and methodologies.

Some general concepts: Society, Community, Association, Institution, Role & Status, Socialization, Conformity and Deviance, Ethnicity and Race.

### **Culture**

Concept of Culture, Components of Culture, Functions of Culture. Cultural diversity, Cultural identity and ethnocentrism.

### **Social Control**

Nature and Types, Agencies

**Social Stratification**

Meaning & Forms, Mobility, Principal Theories, Gender and Stratification.

**Social change**

Meaning and Types, Factors, Principal Theories. Trans-national Corporation & Globalization, Revolution and Social change.

**Indian Society**

Family: Structure, Function and Changes, Marriage: Different forms and functions.

Caste: Attributes, functions, changes, sanskritization

Under-privileged groups:

SC, ST & OBC: Problems and Policies

Women: Dowry, Divorce

Child Labour

Population: Fertility, Mortality, Migration, Population policy of the Government of India

Change: Industrialization, Urbanisation, Environmental movements in India.

Panchayats & Municipalities: Democratic decentralization.

Research Method. Sampling: Types.

Observation: Types, uses and limitations.

Questionnaire: Types, uses and limitations.

Interview: Types, uses and limitations.

Variables, Propositions and Hypotheses.



## SANSKRIT (HONS./PG) [CODE -20]

### 1. GRAMMAR:

Case-ending: Stress on principles and Application in Language, i. e. Syantactic structure, Declension (Special stress on stems ending in at, an, as, Sarvanamans, numerals one to eight.)

Conjugation (Special stress on the groups Bhavadi, Adadi, Rudhadi, and Hvadi. Further Stress on the tenses and moods – lat, lot, lan, vidhilin, lrt, and lit)

Sandhi (specially Visargasandhi)

Krt- Suffixes

Taddhita-Suffixes(special stress on apatya matup etc iyasun isthan)

San, Yan Addition to roots.

Namadhatu-s

### 2. HISTORY OF LITERATURE:

Vedic – Samhitas, Upanisads, Vadangas (Total Structure of the Vedis Literature) Ramayana and Mahabharata. General Knowledge about the Puranas and their content, Dramatic Literature (up to 12<sup>th</sup> Century A.D.).

Narrative Literature

General Knowledge about the works of Manu Kautilya.

Imp. Question on Grammar and translation (from Bengali, English, Into Sanskrit) should be set in a such a way that sense of language and grammatical application could be tested in a varied integrated form.

## URDU(HONS./PG) [CODE -22]

### NAZMEN :-

Iqbal - (Taswir-e-drad)

نظم تصویر درد

Faiz- (Nesar Main Teri Galyan Mein)

نار میں تری گلیوں میں

### MASNAVI :-

Mir Hasan- Piece (Sehrul Beyan)

آغاز داستان

### OASIDA:-

Sawan Mein Diya Phir Mahe Shawwal Dekhai

ساون میں دیا پھر ماہِ شوال دکھائی

by

مذہب

### DASTAN :-

Mir Amman- Syer Tisre Darwesh Ki

سیرتِ تیسرے درویش کی

### FICTION :-

Manto- (Naya Qanoon)

نیا قانون ازمنشو

Bedi-

(Gram Kot)

گرم کوٹ

Drama-

Agha Hashr Kashmir-“ Khubsoorat Bala”

خوبصورت بلا از اناحشر کشمیری

Khutut-

Khutut- e – Ghalib Khat No. 9 – 83 – 88

خطوطِ غالب خط نمبر ۹-۸۳-۸۸

Khaka-

Rashd Ahmed SZiddiqi ( Ganj – hai – Granmaya – “ Asghar Gondwi” )

رشید احمد صدیقی کا گنجائے گرانمایہ

### GRAMMAR:-

Phrases – Gender – Opposites

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