

Semesterwise Courses (Faculty of Horticulture)

Semester-I

Course No.	Title of the Course	Credit Hour
HORT 101	Fundamentals of Horticulture	3(2+1)
HORT 102	Water Management in Horticultural Crops	2(1+1)
ACSS(H) 103	Fundamentals of Soil Science	2(1+1)
AEN(H) 104	Fundamentals of Entomology	3(2+1)
GPB (H)105	Principles of Genetics and Cytogenetics	3(2+1)
ABC(H) 106	Elementary Plant Biochemistry	3(2+1)
ACGP(H) 107	Introductory Microbiology	2(1+1)
AEX(H) 108	Communication Skills and Personality Development [#]	2(1+1)
NSS(H) 109	NSS/NCC/Physical & Health Education	1(0+1)**
ENG 110	Comprehension & Communication Skills in English	2(1+1)
AST(H) 111	Elementary Mathematics [#] (New)	1(1+0)*
Total		24(15+9)
HORT(A)101	Fundamentals of Horticulture	2(1+1)

*R- Remedial Course, ** NC- Nonradial Course; # Common Course for Ag. & Hort

SEMESTER-I

HORT 101: Fundamentals of Horticulture

3 (2+1)

Theory

Scope and importance, classification of horticultural crops and nutritive value, area and production, exports and imports, fruit and vegetable zones of India and of different states, nursery techniques and their management, soil and climate, vegetable gardens, nutrition and kitchen garden and other types of gardens – principles, planning and layout, management of orchards, planting systems and planting densities. Production and practices for fruit, vegetable and floriculture crops. Principles objectives, types and methods of pruning and training of fruit crops, types and use of growth regulators in horticulture, water management–irrigation methods, merits and demerits, weed management, fertility management in horticultural crops–manures and fertilizers, different methods of application, cropping systems, intercropping, multi-tier cropping, mulching– objectives, types merits and demerits, Classification of bearing habits of fruit trees, factors influencing the fruitfulness and unfruitfulness. Rejuvenation of old orchards, top working, frame working, principles of organic farming, market chain management.

Practical

Features of orchard, planning and layout of orchard, tools and implements, identification of various horticultural crops, layout of nutrition garden, preparation of nursery beds for sowing of vegetable seeds, digging of pits for fruit plants, planting systems, training and pruning of orchard trees, preparation of fertilizer mixtures and field application, preparation and application of growth regulators, layout of different irrigation systems, identification and management of nutritional disorder in fruits, assessment of bearing habits, maturity standards, harvesting, grading, packaging and storage.

Suggested Reading:

Prasad and Kumar, 2014. *Principles of Horticulture* 2nd Edn. Agrobios (India).

Neeraj Pratap Singh, 2005. *Basic concepts of Fruit Science* 1st Edn. IBDC Publishers.

Gardner/Bardford/Hooker. J.R., 1957. *Fundamentals of Fruit Production*. Mac Graw Hill Book Co., New York.

- Edmond, J.B, Sen, T.L, Andrews, F.S and Halfacre R.G., 1963. *Fundamentals of Horticulture*. Tata Mc Graw Hill Publishing Co., New Delhi.
- Kumar, N., 1990. *Introduction to Horticulture*. Rajyalakshmi publications, Nagarcoil, Tamilnadu
- Jitendra Singh, 2002. *Basic Horticulture*. Kalyani Publishers, Hyderabad.
- Denisen E.L., 1957. *Principles of Horticulture*. Macmillan Publishing Co., New York.
- Chadha, K.L. (ICAR), 2002, 2001. *Handbook of Horticulture*. ICAR, New Delhi
- K.V. Peter, 2009. *Basics Horticulture*. New India Publishing Agency
- Kausal Kumar Misra and Rajesh Kumar, 2014. *Fundamentals of Horticulture*. Biotech Books.
- D.K. Salunkhe and S.S. Kadam, 2013. *A handbook of Fruit Science and Technology*. CRC Press.
- S. Prasad and U. Kumar, 2010. *A handbook of Fruit Production*. Agrobios (India).
- Jitendra Singh, 2011. *Basic Horticulture*. Kalyani Publications, New Delhi.

HORT 102: Water Management in Horticultural Crops 2(1+1)

Theory

Importance of water, water resources in India. Area of different crops under irrigation, function of water for plant growth, effect of moisture stress on crop growth. Available and unavailable soil moisture – distribution of soil moisture – water budgeting – rooting characteristics – moisture extraction pattern. Water requirement of horticultural crops – lysimeter studies – Plant water potential climatological approach – use of pan evaporimeter – factor for crop growth stages – critical stages of crop growth for irrigation. Irrigation scheduling – different approaches – methods of irrigation – surface and sub-surface pressurized methods viz., sprinkler and drip irrigation, their suitability, merits and limitations, fertigation, economic use of irrigation water. Water management problem, soils quality of irrigation water, irrigation management practices for different soils and crops. Layout of different irrigation systems, drip, sprinkler. Layout of underground pipeline system.

Practical

Measurements of irrigation water by using water measuring devices, use of common formula in irrigation practices, practicing of land leveling and land shaping implements, layout for different methods of irrigation. Estimation of soil moisture constants and soil moisture by using different methods and instruments, scheduling of irrigation, different approaches, practicing use of instruments, estimation of irrigation efficiency and water requirements of horticultural crops, irrigation planning and scheduling, soil moisture conservation practices.

Suggested Reading:

- Rao, Y.P. and Bhaskar, S.R. 2008. *Irrigation technology. Theory and practice*. Agrotech publishing Academy, Udaipur.
- Dilip Kumar Mujmdar. 2004. *Irrigation water management: Principles and Practices*. Prentice Hall of India Pvt. Ltd.,
- S.V. Patil & Rajakumar, G. R., 2016. *Water Management in Agriculture and Horticultural Crops*. Satish serial publishing House, Delhi.
- Carr M. K. V. and Elias Fereres. 2012. *Advances in Irrigation Agronomy*. Cambridge University Press.
- Michael, A.M. 2015. *Irrigation Theory and practices*. Vikas publishing house Pvt., Ltd.

Theory

Composition of earth's crust, soil as a natural body – major components. Eluviations and alleviations formation of various soils. Physical parameters; texture – definition, methods of textural analysis, stock's law, assumption, limitations, textural classes, use of textural triangle; absolute specific gravity/particle density, definition, apparent specific gravity/bulk density – factors influencing, field bulk density. Relation between BD (bulk density), AD – practical problems. Pore space – definition, factors affecting capillary and non-capillary porosity, soil colour – definition, its significance, colour variable, value hue and chroma. Munsell colour chart, factors influencing, parent material, soil moisture, organic matter, soil structure, definition, classification, clay prism like structure, factors influencing genesis of soil structure, soil consistency, plasticity, Atterberg's constants. Soil air, air capacity, composition, factors influencing, amount of air space, soil air renewal, soil temperature, sources and distribution of heat, factors influencing, measurement, chemical properties, soil colloids, organic, humus, inorganic, secondary silicate, clay, hydrous oxides. Ion exchange, cation-anion importance, soil water, forms, hygroscopic, capillary and gravitational, soil moisture constants, hygroscopic coefficient, wilting point, field capacity, moisture equivalent, maximum water holding capacity, energy concepts, PF scale, measurement, gravimetric – electric and tensiometer methods – pressure plate and pressure membrane apparatus – Neutron probe – soil water movement – classification – aerial photography – satellite of soil features – their interpretation; soil orders; land capability classification; soil of different eco-systems and their properties, Rock & Minerals classification, Pedogenic process. Objectives of soil science research institute in India (NBSS&LUP, ISSS, LTFE & NSSTL). Management of Soil Crusting, Soil Compaction and Soil Compression. Soil Biology benefits and harmful effects. Methods and objective of soil survey, Remote sensing application in soil and plant Studies, Soil degradation.

Practical

Collection and preparation of soil samples, estimation of moisture, EC, pH and bulk density. Textural analysis of soil by Robinson's pipette method. Description of soil profile in the field. Quantification of minerals and their abundance. Determination of Soil colour using Munsell Chart. Estimation of water holding capacity and hydraulic conductivity of soils. Estimation of Infiltration rate using double ring infiltrometer method. Estimation of soil moisture using gypsum block and neutron probe method. Soil compaction measurement with Pentrometer. Determination of pore space of soil. Determination of field capacity and permanent wilting point of soil. Determination of soil water potential characteristic curves by tensiometer and pressure plate apparatus. Aggregate size distribution analysis of soil. Air capacity of soil by field method.

Suggested reading:

- Brady Nyle C and Ray R Well, 2014. *Nature and properties of soils*. Pearson Education Inc., New Delhi.
 Indian Society of Soil Science, 2002. *Fundamentals of Soil Science*. IARI, New Delhi.
 Sehgal J. A., 2005. *Textbook of Pedology Concepts and Applications*. Kalyani Publishers, New Delhi.
 Dilip Kumar Das, 2015. *Introductory Soil Science*. Kalyani Publishers, Ludhiana.
 Biswas, T.D. and Mukharjee, S.K., 2015. *Text Book of Soil science*. Tata Mc Graw Hill Publishing Co. Ltd., New Delhi.
 Brady, N.C., 1995. *The Nature and properties of Soils*. Macmillan Publishing Co, New York.
 Ghildyal, B.P. and Tripathi, R.P., 1987. *Soil Physics*. Acad. Press. New York.
 Kolay, A.K., 1983. *Basic concepts of Soil Science*. Wiley Eastern Ltd., New Delhi
 Brady, N. C. and Weil, R. R., 2010. *Elements of the Nature and Properties of Soils* (3rd Edition), Pearson Education, New Delhi.
 Foth, H.D., 1991. *Fundamentals of Soil Science* (8th Edition), John Wiley & Sons, New Delhi.
 Das, D. K., 2011. *Introductory Soil Science* (3rd Edition), Kalyani publisher, Ludhiana (India).
 Khan, T. O. 2013 *Forest Soils: Properties and Management*. Springer International Publishing, Switzerland
 Pritchett and Fisher RF, 1987. *Properties and Management of Forest Soils*. John Wiley, New York.
 Gupta, P.K. 2009. *Soil, Plant, Water and Fertilizer Analysis* (2nd Edition), AGROBIOS, Jodhpur (India).
 Jaiswal, P.C. 2006. *Soil, Plant and Water Analysis* (2nd Edition), Kalyani Publishers, Ludhiana.
 Jackson, M. L. 2012. *Soil Chemical Analysis: Advanced Course*, Scientific Publisher

AEN(H) 104: Fundamentals of Entomology**3(2+1)****Theory**

Introduction to phylum arthropoda. Importance of class Insecta. Insect dominance. History of entomology in India, Importance of entomology in different fields. Definition, division and scope of entomology. Comparative account of external morphonology-types of mouth parts, antennae, legs, wings and genitalia. Structure, function of cuticle & moulting and body segmentation, Anatomy of digestive, Circulatory, Sensory, respiratory, glandular, excretory, nervous and reproductive systems. Types of reproduction. Postembryonic development-eclosion. Matamorphosis. Types of egg larvae and pupa. Classification of insects upto orders, sub-order and families of economic importance and their distinguished characters. Plant mites – morphological features, important families with examples.

Practical

Insect collection and preservation. Identification of important insects. General body organization of insects. Study on morphology of grasshopper or cockroach. Preparation of permanent mounts of mouth parts, antennae, legs and wings. Dissection of grasshopper and caterpillar for study of internal morphology. Observations on metamorphosis of larvae and pupae. Dissection of cockroaches.

Suggested Reading:

- Awasthi, V.B. 1997. *Introduction to general and applied entomology*. Scientific Publishers, Jodhpur, 379 p.
- Borror, D.J., C.A. Triple Horn and N.F.Johnson. 1987. *An introduction to the study of insects (VI Edition)*. Harcourt Brace College Publishers, New York, 875p.
- Chapman, R.F. 1981. *The Insects: Structure and function*. Edward Arnold (Publishers) Ltd, London, 919p.
- Gullan, P.J. and Cranston, P.S. 2001. *The insects- An outline of entomology*, II edition, Chapman & Hall, Madras, 491p.
- Mani, M.S. 1968. *General entomology*. Oxford and IBH Publishing Co. Pvt Ltd., New Delhi, 912p.
- Nayar, K.K., T.N.Ananthakrishnan and B.V. David. 1976. *General and applied entomology*, Tata McGraw Hill Publishing Company Limited, New Delhi, 589p.
- Richards, O.W. and R.G. Davies. 1977. *Imm's general text book of entomology*, Vol.1&2, Chapman and Hall Publication, London, 1345p.
- Romoser, W.S. 1988. *The Science of Entomology*, McMillan, New York, 449p.
- Saxena, S.C. 1992. *Biology of insects*. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi, 366p.
- Srivastava, P.D. and R.P.Singh. 1997. *An introduction to entomology*, Concept Publishing Company, New Delhi, 269p.
- Tembhare, D.B. 1997. *Modern Entomology*. Himalaya Publishing House, Mumbai, 623p.
- Pedigo, L.P. 1999. *Entomology and pest management*. III Edition. Prentice Hall, New Jersey, USA, 691p.
- H. Lewin and Devasahayam. *Practical manual of entomology insect and non-insect pests*.
- Pant, N.C. and Ghai, S. 1981 *Insect physiology and anatomy*, ICAR, New Delhi
- Snodgrass, R.E. 2001. *Principles of Insect Morphology*. CBS Publishers and Distributors, New Delhi
- James, L, Nation. *CRC Press, Insect Physiology and Biochemistry*. Washington

GPB(H) 105: Principles of Genetics and Cytogenetics**3 (2+1)****Theory**

Historical background of genetics, theories and hypothesis. Physical basis of heredity, cell reproduction, mitosis, meiosis and its significance. Gametogenesis and syngamy in plants. Mendelian genetics–Mendel's principles of heredity, deviation from Mendelian inheritance, pleiotropy, threshold characters, co-dominance, penetrance and expressivity. Chromosome theory of inheritance, gene interaction. Modification of monohybrid and dihybrid rations. Multiple alleles, quantitative inheritance linkage and crossing over, sex linked inheritance and characters. Cytoplasmic inheritance and maternal effects. Chemical basis of heredity,

structure of DNA and its replication. Evidence to prove DNA and RNA – as genetic material. Mutations and their classification. Chromosomal aberrations, changes in chromosome structure and number.

Practical

Study of fixatives and stains. Squash and smear techniques. Demonstrations of permanent slides and cell division, illustration in plant cells, pollen fertility and viability, determination of gametes, Solving problems of monohybrid, dihybrid, and test cross ratios using chi-square test, gene interactions, estimation of linkages using three point test cross from F₂ data and construction of linkage maps. Genetics variation in pea.

Suggested Reading:

- Gardner E J, Simmons M J & Snustard D P. *Principles of Genetics (VIII Edn)*. John Wiley & Sons, New York.
- Strickberger. *Genetics*. Macmillan Publishing Company, New York.
- William D. Stansfield. *Theory and Problems of Genetics (3rd Ed)*. Schaum's Outline series - McGraw-Hill Inc.
- Benjamin Lewin. *Genes (II edn)*. John Wiley & Sons, New York.
- Phundan Singh. *Elements of Genetics*. Kalyani publishers, New Delhi.
- Swanson & Webster. *The Cell (V edn)*. Prentice Hall of India Pvt. Ltd, New Delhi
- Norman, V. Rothwell. *Understanding Genetics (IV Ed.)*. Oxford University Press, Oxford.
- Sinnut, Dunn & Dobzhansky. *Principles of Genetics XIX reprint*. Tata McGraw-Hill Publishing Co. Ltd., New Delhi.
- Griffiths, Miller, Suzuki Lewontin & Gelbart. *An introduction to Genetic Analysis (V Ed.)*. W.H. Freeman & Company, New York
- Robert Schieif. *Genetics & Molecular Biology (1986)*. The Benjamin/cummings publishing Co, Inc, California.
- Swanson, Merz & Young. *Cytogenetics (II ed.)*. Prentice Hall of India Pvt. Ltd. New Delhi.
- Joseph Jahier & INRA working group. *Techniques of Plant Cytogenetics (1986)*. Oxford & IBH Publishing Co Pvt. Ltd., New Delhi
- Loewy & Siekevitz. *Cell Structure & Function (II Ed.)*. Oxford & IBH Publishing Co. Pvt. Ltd, New Delhi.
- Stent & Calendar. *Molecular Genetics (II Ed.)*. CBS Publishers, New Delhi
- Singh B D. *Fundamentals of Genetics*. Kalyani Publishers, New Delhi
- Srivastava & Tyagi. *Selected Problems in Genetics (Vol.1-3)*. Anmol Publications Pvt. Ltd., New Delhi
- Khanna VK. *Genetics–Numerical Problems*. Kalyani Publishers, New Delhi.
- Farook & Khan. *Genetics & Cytogenetics (I Ed.)*. Premier Publishing House, Hyderabad.
- Shukla. *Cell Biology (2001)*. Dominant publishers, New Delhi
- George Acquaah. *Principles of Plant Genetics and Breeding*. Blackwell
- B.D. Singh. *Fundamental of Genetics*. Kalyani. India
- Gupta, P.K. 1985. *Cytology, genetics and cytogenetics*. Rastogi Publication, India.

ABC(H) 106: Elementary Plant Biochemistry

3(2+1)

Theory

Carbohydrates: Occurrence, classification and structure, physical and chemical properties of carbohydrates, isomerism, optical activity, reducing property, reaction with acids and alkalis, ozone formation. Lipids: Classification, important fatty acids and triglycerides, essential fatty acids. Physical and chemical control of oils, their rancidity, phospholipids, types and importance. Plant pigments – structure and function of chlorophyll and carotenoids, sterols, basic structure, role of brassino sterols in plants. Proteins: Classification, function and solubility, amino acids – classification and structure, essential amino acids, properties of amino acids, colour reactions, amphoteric nature and isomerism; structure of proteins – primary, secondary tertiary and quaternary properties and reaction of proteins. Enzymes: Classification and mechanism of action; factors affecting enzyme action, co-factors and coenzymes. Vitamins and minerals as

co-enzymes/co-factors. Carbohydrate metabolism – glycolysis and TCA-cycle; metabolism of lipids, fatty acid oxidation, biosynthesis of fatty acids, electron transport chain, bioenergetics of glucose and fatty acids, structure and function of nucleic acid replication, transcription and translation.

Practical

Preparation of standard solutions and reagents; Carbohydrates: Qualitative reactions; Estimation of starch; Estimation of reducing and non reducing sugars from fruits; Amino acids: Reactions of amino acids; Proteins: Estimation of proteins by Lowry's method; Fatty acids: Estimation of free fatty acids; Determination of iodine number of vegetable oils; Vitamins: Estimation of Ascorbic acid; Techniques: Paper chromatography, Thin layer chromatography; Electrophoresis of pigments extracted from flowers, Extraction of oil from oil seeds; Enzymes: Enzyme assay, Enzyme Immobilization.

Suggested Reading:

Lehninger, Nelson, D. L. and Michael, M. C. 2004. *Principles of Biochemistry*. Freeman Publishers
Narayanan L M. Biochemistry. Saras Publications

Bose. Developments in Physiology Biochemistry & Molecular Biology of Plants Vol.-1. New India Publications.

Voet, D and Voet J. G. 2004. Biochemistry 4th Edn. Wiley & sons Publishers. USA.

Sadashiv, S and Manickam, A. 1996. Biochemical methods for Agricultural sciences. New age International publishers, New Delhi.

Voet, D. and Voet, J.G. 2004. (3rd edit). Biochemistry. John Wiley & sons Incl.USA.

Rameshwar, A. 2006. (3rd edit). Practical Biochemistry. Kalyani Publishers, NewDelhi.

Buchanan, B. B., Grussem, W. and Jones, R. L. 2002. Biochemistry and molecular biology of plants. 2nd edition. Blackwell publications, UK.

ACGP(H) 107: Introductory Microbiology

2(1+1)

Theory

History and Scope of Microbiology: The discovery of micro-organism, spontaneous generation conflict, germ theory of diseases, microbial effect on organic and inorganic matter. Development of microbiology in India and composition of microbial world. Microscopy and Specimen Preparation: The bright field microscope, fixation, dyes and simple staining, differential staining. Difference between prokaryotic and eukaryotic cells. Prokaryotic cell structure and functions. Types of culture media and pre-culture techniques. Microbial growth in models of bacterial, yeast and mycelia growth curve. Measurement of bacterial growth. General properties of viruses and brief description of bacteriophages. DNA as genetic material. Antibiosis, symbiosis, intra-microbial and extra-microbial association. Sterilization methods – Physical and chemical, Isolation of pure cultures and preservation of cultures, Plant growth promoting microorganisms and mushrooms – Economical importance, Industrially important microorganisms in large scale production and common microbial fermentations. Mushrooms- edible and poisonous types, nutritive values, Culturing and production techniques.

Practical

Examination of natural infusion and living bacteria; examination of stained cells by simple staining and Gram staining. Methods for sterilization and nutrient agar preparation. Broth culture, agar slopes, streak plates and pour plats, turbid metric estimation of microbial growth, mushroom culture- Spawn production, Culture and production techniques, harvesting, packing and storage.

Suggested Reading:

M T Madigan, and J M Martinko, 2014. *Brock Biology of Microorganisms* 14th Edn. Pearson.

- M J Pelczer, 1998. *Microbiology* 5th Edn. Tata McGraw Hill Education Pvt. Ltd.
- Stainer, R, 1987. *General Microbiology*. Palgrave Macmillan.
- Edward Alchano, 2002. *Introduction to Microbiology*. Jones and Bartlett hearing.
- R P Singh, 2007. *General Microbiology*. Kalyani Publishers.
- J Heritage, E G V Evans, R A Killington, 2008. *Introductory Microbiology*. Cambridge University press P. date.
- Pelczar, jr. M.J.E.C.S.Chan and Krieg, N.R. 1996. *Microbiology*. Mc Graw Hill Publishers, Newyork.
- Prescott, L.M. Harley, J.P. and Klein, D.A (5ed) 2002. *Microbiology*. Mc Graw Hill Publishers, Newyork.
- Madigan, M. Martinkoj, M. and Parker (10 ed.) 2003. *Biology of Microorganisms*. Prentice Hall of India Pvt. Ltd., New Delhi.
- Jamaluddin, M. Malvidya, N. and Sharma, A. 2006. *General Microbiology*. Scientific Publishers, Washington.
- Sullia, S.B, and Shantaram 1998. *General Microbiology*. Oxford and IBH.

AEX(H) 108: Communication Skills and Personality Development

2(1+1)

Theory

Structural Grammar: Introduction of Word Classes; Structure of Verb in English; Uses of Tenses; Study of Voice; Study of Conjunctions and Prepositions; Sentence Patterns in English. Spoken English: Conversations of different situations in everyday life; the concept of stress; stress shift in words and sentences; silent letters in words and pronunciation of words with silent letters, the basic intonation patterns. Reading and comprehension of general and technical articles, précis writing, summarizing, abstracting; individual and group presentations, impromptu presentation, public speaking; Group discussion. Organizing seminars and conferences.

Practical

Structural Grammar: Exercises in word classes, identification and study of verbs in sentences, application of tenses and voice, exercises in conjunctions and prepositions, other structural grammar exercises, report writing, letter writing (different types of letters). Spoken English: Conversations of everyday life, the concept of stress; stress shift. Silent letters in words, basic intonation patterns, preparing and address

NSS(H) 109: NSS/NCC/ Physical & Health Education

1 (0+1)

Practical

NSS: Orientation of students in national problems, study of philosophy of NSS, fundamentals rights, directive principles of state policy, socio-economic structure of Indian society, population problems, brief of five year plan. Functional literacy, non-formal education of rural youth, eradication of social evils, awareness programmes, consumer awareness, highlights of consumer act. Environment enrichment and conservation, health, family welfare and nutrition. **NCC:** Introduction to NCC, defense services, system of NCC training, foot drill, sizing, forming up in three ranks, open and close order march, dressing, getting on parade, dismissing and falling out, saluting, marching, arms drill, shoulder arm, order arm, present arm, guard of honour, ceremonial drill, weapon training – rifle bayonet, light machine gun, sten machine carbine, introduction and characteristic stripping, assembling and cleaning, loading, unloading and firing. Field craft, visual training, targets, judging distance, fire discipline and fire control orders, battle craft, field signals, description of ground, section formation, section battle drill, scouts and patrols, ambush, field engineering, map reading, conventional signs, grid systems, use of service protractor, prismatic compass and its use, self-defense, general principles, precautions and training, attacks and counter attacks, marching and searching, first aid, hygiene and sanitation, civil defense, leadership and NCC song.

Physical Education: Introduction to physical education. Posture, exercise for good posture, physical fitness exercises for agility, strength, coordination, endurance and speed. Rules are regulations of important games, skill development in any one of the games – football, hockey, cricket, volleyball, ball badminton, throw ball, tennikoit. Participation in one of the indoor games – shuttle badminton, chess and table tennis. Rules and regulations of athletic events, participation in any one of the athletic events – broad jump, high jump, triple

jump, javelin throw, discus throw, shot put, short and long distance running, Safety education, movement education, effective way of doing day-today activities. First-aid training, coaching for major games and indoor games. Asanas and indigenous ways for physical fitness and curative exercises. Exercises and games for leisure time, use and experience. Importance of Asanas and Surya namaskar. Free hand exercises and Yoga. Recreation: definition, agencies promoting recreation, camping and recreation. Note: Warming up and conditioning exercises are compulsory before the commencement of each class.

Suggested Reading:

O.P. Aneja. Encyclopaedia of Physical education, sports and exercise science (4 volumes).

Anil Sharma. Encyclopaedia of Health and Physical Education (7 Volumes).

N V Chaudhery, R Jain. Encyclopedia of Yoga Health and Physical Education (7 Volumes).

Pintu Modak, O P Sharma, Deepak Jain. Encyclopaedia of Sports and Games with latest rules and regulations (8 volumes).

Edwin F Bryant. Yoga sutrap of Patanjali

ENG(H) 110: Comprehension and Communication Skills in English

2(1+1)

Theory

War Minus Shooting- The sporting Spirit. A Dilemma- A layman looks at science Raymond B. Fosdick. You and Your English – Spoken English and broken English G.B. Shaw. Reading Comprehension,

Vocabulary- Antonym, Synonym, Homophones, Homonyms, often confused words. Exercises to Help the students in the enrichment of vocabulary based on TOEFL and other competitive examinations. Functional grammar: Articles, Prepositions, Verb, Subject verb Agreement, Transformation, Synthesis, Direct and Indirect Narration. Written Skills: Paragraph writing, Precise writing, Report writing and Proposal writing.

The Style: Importance of professional writing. Preparation of Curriculum Vitae and Job applications.

Synopsis Writing. Interviews: kinds, Importance and process.

Practical

Listening Comprehension: Listening to short talks lectures, speeches (scientific, commercial and general in nature). Oral Communication: Phonetics, stress and intonation, Conversation practice. Conversation: rate of speech, clarity of voice, speaking and Listening, politeness & Reading skills: reading dialogues, rapid reading, intensive reading, improving reading skills. Mock Interviews: testing initiative, team spirit, leadership, intellectual ability. Group Discussions.

Suggested Reading:

Balasubramanian T. 1989. *A Text book of Phonetics for Indian Students*. Orient Longman, New Delhi.

Balasubrmanyam M. 1985. *Business Communication*. Vani Educational Books, New Delhi.

Naterop, Jean, B. and Rod Revell. 1997. *Telephoning in English*. Cambridge University Press, Cambridge.

Mohan Krishna and Meera Banerjee. 1990. *Developing Communication Skills*. Macmillan India Ltd. New Delhi.

Krishnaswamy, N and Sriraman, T. 1995. *Current English for Colleges*. Macmillan India Ltd. Madras.

Narayanaswamy V R. 1979. *Strengthen your writing*. Orient Longman, New Delhi.

Sharma R C and Krishna Mohan. 1978. *Business Correspondence*. Tata Mc Graw Hill publishing Company, New Delhi.

Carnegie, Dale. 2012. *How to Win Friends and Influence People in the Digital Age*. Simon & Schuster.

Covey Stephen R. 1989. *The Seven Habits of Highly Successful People*. Free Press.

- Spitzberg B, Barge K & Morreale, Sherwyn P. 2006. *Human Communication: Motivation, Knowledge & Skills*. Wadsworth.
- Verma, KC. 2013. *The Art of Communication*. Kalpaz.
- Dr. T. Bharati, Dr. M. Hariprasad and Pro. V. Prakasam, *Personality Development and Communicative English*. Neelkamal Publications Pvt. Ltd, New Delhi.
- Wren and Martin, S. *Key to High School English Grammar and Composition*- Chand and Company Ltd., New Delhi
- Wren and Martin, S. *High School English Grammar and Composition*- Chand and Company Ltd., New Delhi
- Raymond Murphy, *English Grammar in Use*. Cambridge University Press
- The Official Guide to the TOEFL Test-IV Edition, Educational Testing Services. Mc Graw Hill, New Delhi.
- Balasubramanyam, M. 1985. *Business communication*. Vani Educational Books Ansari road, New Delhi.
- Krishna Mohan and Meera Banerjee 1990. *Developing Communication Skills*. Macmillan India Ltd.

AST(H) 111: Elementary Mathematics

Credit : 1(1+0)

Theory

Basic ideas of Sets, set operations, laws of Algebra of sets, number of elements in a set, Venn diagram, Cartesian product of sets. Definitions and ideas, Types of Matrices, Matrix operations, Transpose, Symmetric and Skew symmetric matrices with properties. Determinants, Properties of Determinants (without proof), minors and cofactors, Product, Adjugate and reciprocal of determinants, Differentiation and Integration of determinants, Cramer's Rule, Adjoint and Inverse of matrices, Orthogonal Matrix, Rank and Equivalence, Solution of system of Equations by Matrix method and rank method. Ideas of Functions (Different kinds of functions with examples), Limits and Continuity (No problems) Differentiation: Derivative of polynomial and trigonometric functions, composite functions, chain rule, derivatives of inverse trigonometric functions, derivative of implicit functions. Derivatives of logarithmic and exponential functions. Logarithmic differentiation, derivative of functions expressed in parametric forms.

Indefinite integrals, Method of substitution, Standard forms, Rules of integration, Integration by parts, Partial fraction method. Definite integral as limit of a sum and its geometrical interpretation, Fundamental theorem of integral calculus. Elementary properties of definite integrals. Evaluation of definite integrals, Sequences, Convergence of sequences, infinite series of constant terms, Tests of convergence, Comparison test, D'Alembert's ratio test, Cauchy's root test.