Test Structure, Syllabus and Model Questions for

Master's Entrance Test

(MET)

2019-2020

PUNJAB AGRICULTURAL UNIVERSITY

LUDHIANA

CONTENTS

MET - AGRICULTURE

(For admission to M.Sc. programmes in Agronomy, Agricultural Meteorology, Entomology, Extension Education, Food Technology, Forestry, Horticulture (Floriculture & Landscaping), Horticulture (Fruit Science), Horticulture (Vegetable Science), Plant Breeding & Genetics, Plant Pathology, Soil Science, Agricultural Economics)

1. Test Structure

(a) The question paper shall have two SECTIONS:

SECTION-I: General Agriculture, which will be compulsory for all the candidates.

SECTION-II: A candidate has to opt for at least one discipline out of the following. However, a maximum of two disciplines can be selected as per candidate's eligibility:

1. Agronomy / Agricultural Meteorology
2. Entomology
3. Extension Education
4. Food Technology
5. Forestry
6. Horticulture (Floriculture & Landscaping)
7. Horticulture (Fruit Science)
8. Horticulture (Vegetable Science)

} One discipline i.e. Horticulture (Flori. & Landsc/ Fruit Sci/ Veg. Sci)

9. Plant Breeding and Genetics
10. Plant Pathology
11. Soil Science
12. Agricultural Economics

Any change in choice of discipline will not be allowed after the submission of application form.

(b) There will be 150 multiple choice type questions **(SECTION-I: 90; SECTION-II: 60)** each carrying one mark which are to be attempted by the candidates in the allotted time of **2 hours 10 minutes.**

For Agricultural Economics, weightage will be 50% for SECTION-I and 50% for SECTION-II.

(c) Candidates appearing for two disciplines will be required to sit for **additional SECTION-II** paper chosen by him/ her consisting of **60 questions** which is to be attempted in additional allotted time of **50 minutes**.

(c) Each correct answer will carry one mark whereas ¼ mark will be deducted for every wrong answer

(d) Minimum percentage of marks required in the Entrance Test to be called for Counselling is 20% with negative marking.

2. Syllabus

SECTION - I:

General Agriculture

Issues facing modern day agriculture in Punjab. Principles of crop production. Improved varieties, cultural practices, major pests and diseases (and their control) of wheat, rice, cotton, sugarcane, pulses, oilseeds and important vegetables, fruits and ornamentals of Punjab. Importance, status and scope of fruit industry in Punjab. Importance and classification of vegetable crops in Punjab. Breeding method of self-pollinated, cross pollinated and vegetatively propagated crops. Seed certification. Principles of agroforestry. Scope of floriculture and landscaping in Punjab. Functions and deficiency symptoms of micro and macronutrients. Problematic soils, their characteristics and management. Improved irrigation practices in field and horticultural crops. Water resources of Punjab state. Organic manures, inorganic and biofertilizers. Handling, processing and preservation of foods of plant and animal

origin. Fundamentals of agricultural business and marketing. Extension education in relation to rural development and precision farming. World trade in agriculture, commodities, quarantine, SPS measures and IPRs.

SECTION - II:

Agronomy / Agricultural Meteorology

Farming systems, cropping systems, cropping patterns, cropping schemes and crop plans, sustainable agriculture. Crop weed competition. Principles and practices of weed management; weed management in important field crops and non-cropped areas. Herbicides – classification, formulation, mode of action and compatibility with other agro- chemicals. Origin, distribution climatic requirements and agronomic practices of important spice, aromatic, medicinal and plantation crops. Soil-water-plant relationships. Criteria of scheduling irrigation, irrigation methods, agricultural drainage, water management in important *Kharif* and *Rabi* crops. Role of mulching. Origin, distribution, economic importance, soil, climatic requirements, varieties and agronomic practices of important *Kharif* and *Rabi* crops. Organic farming-introduction, concept, organic production requirements, biological intensive nutrient management, use of biocontrol agents & quality considerations. Soil fertility, productivity; manures and fertilizers, crop residue management.

Weather, climate and agriculture. Effects of environmental factors on crop growth and development. Agroecosystem and agroclimatic zones of India. Structure and composition of earth's atmosphere, Atmospheric weather variables, Weather forecasting – types and applications, Monsoon – mechanism and importance in agriculture, Weather hazards, Microclimatic modifications, Climate change and its impacts on agriculture.

Entomology

Body regions and segmentation in insects. General morphology and anatomy of insects. Integument, moulting and metamorphosis. Modifications of mouth parts and other body appendages. Sense organs. Diapause. Types of reproduction. Taxonomic categories. Binomial nomenclature. Classification of insects into orders, sub-orders and families of economic importance. Biotic potential. Resistance to biotic and abiotic stresses. Population dynamics. Pest surveillance and forecasting. Concept of economic threshold. Integrated Pest Management, tools of IPM - physical, mechanical, cultural, biological (parasites and predators, microbial agents), host plant resistance, botanical, chemical, biorational and biotechnological. Integration of different IPM tactics. Distribution, host range, nature & extent of damage, life histories and control of insect-pests of field, vegetable, plantation and fibre crops, fruit and forest trees, ornamental plants and stored grains. Beneficial insects. Pesticides - classification, mode of action and toxicity, formulations, compatibility, synergism and antidotes. Pest control equipment.

Extension Education

Objectives, principles and philosophy of extension education. Models, barriers and feedback in communication. Communication skills for effective transfer of technology. Audio-visual aids - selection, preparation, use and evaluation. Role of information and communication technology in agriculture and rural development. Diffusion and adoption processes. Models of adoption process. Factors influencing adoption process. Extension teaching methods and factors influencing their selection and use. Programme planning - principles and procedures. Monitoring and evaluation of extension programmes. Rural development - past strategies and current approaches. Role of community development, voluntary agencies and Panchayati Raj Institutions in rural development. Scope and importance of journalism in agriculture. Scope and importance of educational psychology. Teaching - learning process. Principles of learning and their implications for teaching. Importance and types of inter-personal perception, human interaction and social behaviour. Barriers in human resource development and establishing good human relations. Need, and scope of cyber extension. Privatization of extension. Broad based extension. Problem - solving skills. Defence machanism. Group dynamics. Group behaviour and conflict management. Decision - making process. Leadership, different methods of identifications of leaders and their training. Importance of rural sociology in agricultural extension. Social groups. Social stratification. Social organization. Social control, Social change and their factors.

Food Technology

Major nutritional deficiency diseases. Food groups and concepts of balanced diet. Food adulteration. Food laws and food safety. Post-harvest technology of perishable and semi-perishable agricultural and animal produce. Processing techniques and preservation of cereals, oilseeds, milk, fruits, vegetables, meat and poultry. Status of food industry in India. Preparation of jams, jellys, vinegar, ketchup, pickles and chutneys. Role of pectin in gel formation. Disposal of waste from fruit and vegetable processing plants. Filled and fermented milk. Preparation of cheese, ice- cream, condensed and evaporated milk, whole- and skim-milk powder. Milk plant sanitation. Utilization of milk by- products. Structure of different grains - wheat, rice, barley, oat, corn and millets. Flour and its use in bakery products. Milling and parboiling of paddy. Rice bran oil. Preparation of extruded products. Structure, composition, nutritive value and functional properties of egg. Preparation of egg products. Slaughter and dressing of poultry and other meat animals. Meat tenderization. Preservation and utilization of meat and poultry processing plant by-products. Restructured meat and poultry products. Food quality and safety management system.

Forestry

Status of forests in India and their role. Forestry Organisations both national and international. Distribution of forests and their classification. Locality factors. Tending operations. Importance of superior phenotypes and their use in plantations. Forest regeneration. Choice of species w.r.t. site/economic uses. Rehabilitation of degraded/ waste lands through afforestation and dendroremediation. Forest Policies and laws. Agroforestry, farm forestry and social forestry, Agro forestry models/ systems. Silvicultural aspects of tree species of economic importance: *Tectona grandis, Dalbergia sissoo, Acacia nilotica, Melia spp., Eucalyptus spp., Populus deltoides, Dendrocalamus strictus, Azadirachta indica*. Forest management: growing stock, normal forest, sustained yield and rotation. Measurement of tree height, diameter, girth, bark thickness, increment, age, volume and biomass Climate change and forests. Short rotation intensive management of forest plantations. Trees outside forests and energy/industrial plantation. Forest fire management. Forestry extension: participatory rural appraisal and joint forest management. Forest utilization and marketing of forestry produce. Export and import of timber and non- timber forest products.

Horticulture

Floriculture and Landscaping: Production technology of annuals, rose, chrysanthemum, gladiolus, carnation, cacti and succulents. Post-harvest handling of cut flowers. Flower seed production. Characteristics of different types of gardens. Landscape art principles. Principal groups of plants (trees, shrubs, climbers, shade loving plants, ground covers), their analysis and use in landscape composition. Landscape planning for homes and farm complexes. Rock, water and terrace gardens.

Fruit Science: Seed dormancy and germination. Stock scion relationship, Dwarfing rootstocks, different methods of propagation, containers, media, mixture, propagation structure, Nursery act, quarantine and certification. Ecophysiological requirement, varieties, Horti-agro techniques, plant protection measures, cultivation practices, special problems, maturity indices, ripening, harvesting, transportation, quality improvement, processing and packaging technologies of major fruits such as citrus, mango, guava, apple, ber, grapes, papaya, pineapple, banana, pomegranate, sapota, litchi, pear, peach and plum.

Vegetable Science: Role of soil, climate and agronomic factors in potato, tomato, chilli, brinjal, cauliflower, cabbage, radish, carrot, onion, garlic, peas, beans, methi, spinach, muskmelon, pumpkin, bittergourd, bottlegourd and okra. Vegetable forcing. Nursery management. Post-harvest handling, storage and marketing of vegetables. Breeding methods for vegetable crops. Production of nucleus, breeder, foundation, certified and F1 hybrid seeds. Seed harvesting, processing and storage

Plant Breeding and Genetics

Mendelian inheritance. Cell division and cell cycle. Chromosome structure and function. Chromosome abberations. Polyploidy. Genetic recombination. Gene concept, organization, replication and function of genetic material. One gene - one enzyme hypothesis. Genome analysis. Gene frequency and Hardy-Weinberg equilibrium.

Quantitative inheritance. Heritability and response to selection. History and achievements of plant breeding. Ger-

mplasm resources - their origin, conservation and utilization. Male sterility, self-incompatibility, mutation and polyploidy in plant breeding. Heterosis and its exploitation. Breeding methods in self-pollinated (pure line and mass selection, pedigree, bulk, SSD and backcross method); cross pollinated (population improvement methods, recurrent selection techniques) and vegetatively propagated crops. Combining ability analysis. Breeding of wheat, rice, cotton, maize, sugarcane, oilseeds and pulse crops. Plant Breeders' Rights. Principles of field plot techniques. Designs for plant breeding experiments. Genotype x environment interaction and stability of varieties. Breeding for diseases and insect-pest resistance in crop plants. Tissue culture, micro-propagation, somaclonal variation, somatic hybridization and production of transgenic plants. Genetic engineering in relation to plant breeding.

Plant Pathology

Characteristics of fungal, bacterial and viral pathogens of plants, Plant disease concepts, Classification of plant diseases, Infection, growth, reproduction and dissemination of plant pathogens, Pathogenesis, Variability in plant pathogens, Plant disease epidemics, Nature of host-resistance, Seed health testing, Methods of plant disease management. Distribution, symptoms, etiology, predisposing factors, perpetuation and control of important diseases of field crops (rice, sorghum, bajra, maize, wheat, barley, sugarcane, turmeric, tobacco, groundnut, sesamum, castor, sunflower, rapeseed & mustard, cotton, pulses, mentha and berseem), vegetables (chilli, brinjal, okra, potato, crucifers, cucurbits, tomato, pea, beans, onion, garlic, coriander), fruits (citrus, mango, banana, grapevine, pomegranate, papaya, guava, sapota, ber, apple, pear, peach, plum, coconut, betelvine, mulberry, coffee, tea) and ornamentals (rose, chrysanthemum, gladiolus, marigold and jasmine) Field diagnosis of important diseases of Rabi and Kharif crops, vegetables, fruits , forest and ornamental plants. History and principles underlying host resistance, chemical, physical, cultural, biological and legislative measures of plant disease management. Registration, commercial development and compatibility of fungicides with other chemicals. General account of plant protection appliances. Development of resistance in pathogens against fungicides. Non-target effects of fungicide use. Methods of screening for disease resistance. Seed certification standards and phytosanitory measures. Importance of post-harvest diseases. Important post-harvest diseases of fruits and vegetables. History and economic importance of plant parasitic nematodes. General characteristics, identification, their classification and relationship with other organisms Morphology, biology and control of important genera of nematodes causing diseases of cereals, fruits and vegetables. Principles and methods of control.

Soil Science

Weathering of minerals and rocks. Factors of soil formation and their dynamics. Pedogenic processes. Soil survey and mapping. Soil taxonomy. Land suitability evaluation for agriculture. Soils of Punjab and India. Soil colloids. Cation and anion exchange. Soil reaction. Saline and sodic soils - characterization and amelioration. Plant nutrients - functions, deficiency systems, transformation and availability. Soil fertility evaluation and maintenance. Fertilizers and their use efficiency. Concept of integrated fertilizer use. Soil testing - importance and problems. Principles in the determination of available nitrogen, phosphorus, potassium, sulphur and zinc in soils. Analysis of fertilizers and irrigation water. Micro- and macro-organisms in soils and their role in biochemical decomposition of organic manures, farm wastes and nutrient transformations. Biochemistry of humus formation and biogas production. Soil water. Forces of water retention. Saturated and unsaturated water movement, infiltration and redistribution. Criteria for scheduling of irrigation. Soil, water and wind erosion - significance, causes, processes and control. Soil erodibility and rainfall erosivity indices.

Agricultural Economics

Micro Economics: consumption, production, costs, demand and supply and factors affecting them. Forms of market structure and price determination under perfect competition and monopoly, pricing of factors of production. Macro Economics: Basic Concepts, National income accounting, Theories of consumption, Investment and its determinants, Income determination model including money and interest. Monetary, fiscal, wage and employment policies, Measures of full employment, Inflation-Types, causes and remedies. Farm management: Typical decisions and principles of farm management, Farm records and business accounting, Farm planning, Factor-factor, factor-product and product-product relationships. Agricultural marketing: Types of markets, Methods of sale, Market functions and institutions. Agricultural Credit: Need and classification of credit, Importance of credit institutions. Three R's of

credit, Repayment schedule. Role of economics liberalization in agriculture, Formulation and evaluation of different agricultural products such as dairy, poultry, fishery, floriculture under Punjab conditions. Importance of agriculture in Indian economy, comparison with other countries. Economic problems in Indian agriculture relating to agricultural production and productivity, credit, marketing and labour. Principles and role of agricultural cooperatives.

3. Model questions

General Agriculture

1. NAARM is located at

   (A) New Delhi B) Hyderabad

   (C) Karnal (D) Cuttack

2. Percentage of net sown area in India which is irrigated is :

   (A) 62 (B) 38

   (C) 65 (D) 35

Agronomy / Agricultural Meteorology

1. Puddling operation is followed in

   (A) Wheat (B) Cotton

   (C) Rice (D) Sugarcane

2. Sensor in the minimum thermometer is

   (A) Water (B) HCl

   (C) Mercury (D) Alcohol

Entomology

1. Whole of the sugarcane plant above attacked portion dries up due to attack of

   (A) Top borer (B) Shoot borer

   (C) Root borer (D) Gurdaspur borer

2. The digestion and absorption of food in insects take place in

   (A) Proctodaeum (B) Stomodaeum

   (C) Mesentron (D) Proventriculus

Extension Education

1. When something is put forth as a point of view or an assumption and its proof is not known, it is called

   (A) Hypothesis (B) Theory

   (C) Principle (D) Objective

2. The term Human Resource Development covers the area of

   (A) Education (B) Training

   (C) Development (D) All the three

Food Technology

1. Maize protein is known as

   (A) Gluten (B) Zein

   (C) Hordein (D) Oryzin

2. The enzyme used for tenderization of meat is

   (A) Papain (B) Invertase

   (C) Bacterial peptidase (D) Runnel

Forestry

1. Main component in wood is
   (A) Cellulose (B) Hemicellulose
   (C) Lignin (D) Extractives
2. Lignotubers are found in
   (A) Kikar (B) Poplar
   (C) Eucalyptus (D) Neem

Horticulture (Floriculture & Landscaping / Fruit Science / Vegetable Science)

1. The nutrient which improve fruit quality
   (A) Zinc (B) Calcium
   (C) Nitrogen (D) Potassium
2. Buttoning is a physiological disorder in
   (A) Cauliflower (B) Cabbage
   (C) Tomato (D) Onion

Plant Breeding & Genetics

1. Multiline variety is a mixture of
   (A) Pure lines (B) Inbred lines
   (C) Isogenic lines (D) Hybrids
2. Selection is more effective if heritability is
   (A) High (B) Low
   (C) Zero (D) Negative

Plant Pathology

1. Loose smut of wheat caused by Ustilago tritici completes following number of life cycles during crop season
   (A) One (B) Two
   (C) Three (D) Four
2. Phytoplsma are sensitive to
   (A) Penicillin (B) Bavistin
   (C) Tetracycline (D) Calixin

Soil Science

1. Which one is immobile plant nutrient
   (A) Potassium (B) Sulphur
   (C) Phosphorus (D) Calcium
2. Which nutrients soil gets from Diammonium phosphate
   (A) Nitrogen (B) Phosphorus
   (C) Potash (D) Nitrogen and Phosphorus

Agricultural Economics

1. Consumption function studies the relationship between consumption and
   (A) Saving (B) Investment
   (C) Income (D) None
2. Inflation is due to
   (A) Increase in demand (B) Decrease in money supply
   (C) Increase in commodities supply (D) All the above

MET - BIOTECHNOLOGY

(For admission to M.Sc. Biotechnology programme)

1. Test Structure

(a) There will be 200 multiple choice type questions each of one mark to be attempted in allotted time of 3 hours.

(b) Each correct answer will **carry one mark** whereas **¼ mark** will be **deducted** for every wrong answer.

(c) Minimum 20% marks are required in the Entrance Test to be called for Counselling/interview.

2. Syllabus

Biotechnology and its applications. Mendel's laws. Nature, structure and replication of genetic material. Chromatin and Chromosome structure. Cell division. Structure and organization of prokaryotic and eukaryotic genome. Chromosomal aberrations. Polyploidy and aneuploidy. Gene structure, function and regulation. Spontaneous and induced mutations. Fluorescent *in situ* hybridization.

Plant tissue culture and its applications. Somatic cell culture. Somatic embryogenesis. Meristem culture. In vitro grafting. Micropropagation. Anther and pollen culture. Embryo/ovule/ovary culture. Protoplast culture and somatic hybridization. Production of secondary metabolites through tissue culture. Recombinant DNA technology: Restriction endonucleases and cloning vectors. Gene cloning, Southern, Northern and Western blotting. Genetic transformation in plants and bacterial cells. Commercial applications of transgenics, Biosafety, bioethics and intellectual property rights in biotechnology.

Genomic and cDNA libraries. PCR: principles and applications. Molecular markers: SSR, RFLP, AFLP, STS and SNP markers, DNA fingerprinting. Mapping populations and linkage maps, Methods of gene mapping. DNA sequencing: Sanger and Next generation sequencing. Introductory genomics, transcriptomics and proteomics. Bioinformatics tools and techniques, Biological databases. Nanobiotechnology.

3. Model questions

1. A segment of a eukaryotic gene that code for a specific protein segment is called:
   (A) An intron (B) An exon
   (C) A promoter (D) An Enhancer
2. Which one is the natural auxin?
   (A) 2,4 D (B) NAA
   (C) IAA (D) IBA
3. Hybrids are generally superior to parents because of:
   (A) Homozygosity (B) Hybrid vigor
   (C) Parents are generally weak (D) None of these
4. The preferred organism for lactic acid production is:
   (A) *Streptococcus lactis* (B) *Lactobacillus bulgaricus*
   (C) *L. delbrueekii* (D) *L. casei*
5. How many nucleotides in DNA code for one amino acid in the protein:
   (A) Two (B) Three
   (C) Four (D) Five

MET - AE

(For admission to M.Tech. programmes in Farm Machinery & Power Engineering, Processing & Food Engineering, Soil & Water Engineering)

1. Test Structure

(a) There will be 200 multiple choice type questions each of one mark to be attempted in allotted time of 3 hours.

(b) There will be 60 questions each from Farm Machinery & Power Engineering, Processing & Food Engineering; Soil & Water Engineering and 20 questions from Mathematics & Statistics.

(c) Each correct answer will **carry one mark** whereas ¼ **mark** will be **deducted** for every wrong answer.

(d) Minimum 20% marks are required in the Entrance Test to be called for Counselling/interview.

2. Syllabus

Farm Machinery & Power Engineering:

Sources of farm power: conventional & non-conventional energy sources. Review of thermodynamic principles of IC engines. Study of engine systems, components - their mechanisms, operating principles, functions and requirements, detonation and knocking in IC engines. Study of properties and requirements of lubricants, coolants and their additives. Tractor systems - transmission, steering, brake, hydraulics and power outlets. Traction theory principles. Tractor chassis mechanics and tractor stability. Human factors in tractor design Objectives of farm mechanization. Principles of operation and selection of machines used for crop production. Field capacities & economics. Study of primary and secondary tillage equipment. Forces acting on tillage tools. Sowing, planting and transplanting equipment, components, working principles and calibration. Plant protection and fertilizer application equipment. Crop harvesting and threshing machinery, combines, their economics and losses. Testing of farm machinery and importance. Selection and management of farm machines. Introduction to design parameters of agricultural machines. Design of standard power transmission components used in agricultural machines: mechanical & hydraulic units. Introduction to materials, cutting tools and manufacturing methods. Jigs and fixtures and their application. Process planning analysis and production controls. Reliability of machine system. Energy cycle of earth: energy sources and classification; handling and pre-conditioning of biomass; biomass characteristics; principles, types construction. Operation, maintenance and uses of non-conventional energy devices like biogas plant, biomass gasifier. Energy management and conservation

Processing & Food Engineering:

Engineering properties of biological materials; material and energy balances in unit operations; particle size analysis; size separation and screening; centrifugal separation; fluidization of granular solids. Thermal process calculations; Principles of food preservation ; psychrometry; conditioning and drying of food grains; concentration and dehydration of foods; evaporators, tray, drum and spray dryers; processes and machines for processing of cereals pulses and oil seeds. Grain conveying and handling equipments-operation and maintenance. Planning and design of farmstead, livestock and animal housing; poultry shed; animal feed handling and waste disposal system; storage of fruit vegetable and other perishable products, estimating and cost analysis of farm buildings.

Soil & Water Engineering:

Water resources of India. Hydrologic cycle; principles and mechanics of soil erosion; land leveling criteria, equipment; biological and engineering measures to control erosion; ponds and earth embankments; watershed management; well hydraulics; tube well design, construction, development; type of irrigation pumps and design; water measuring devices and conveyance systems; soil plant water relationship, irrigation methods design and evaluation; efficiencies, surface drainage of agricultural lands, sub surface drainage; reclamation of saline/alkaline soils; command area development; land use capability. classifications; irrigation scheduling; canal outlets types, design; conjunctive use of water; economical irrigation.

Mathematics & Statistics:

Introduction to mathematical statistics. Differential and integral calculus. Matrices and Fourier series; differential equations; vector algebra & vector calculus; elementary numerical analysis.

3. Model Questions

Farm Machinery & Power Engineering:

1. When plates of a battery cell are made larger in size, we get increased :
   (A) Current (B) Voltage
   (C) Cell resistance (D) No change
2. Net traction coefficient is the ratio of net pull produced to the
   (A) Normal load (B) Dynamic normal load
   (C) Weight transfer (D) Total soil reaction
3. Which of the following is generally checked during wheel alignment in a garage
   (A) Camber angle (B) Caster angle
   (C) Toe-in (D) Kingpin inclination
4. Which of the following is a deep tillage implement
   (A) Mould-board plough (B) Disc plough
   (C) Chisel plough (D) Rotary plough

Processing & Food Engineering:

1. In Cryogenic freezer, the most commonly refrigerant (Cryogen) used is :
   (A) Ammonia (B) Helium
   (C) Oxygen (D) Liquid nitorgen and liquid carbon dioxide
2. Which of the following is not a processing operation ?
   (A) Winnowing (B) Size reduction
   (C) Dehusking (D) Digestion
3. The equipment used for size reduction in roller flour milling of wheat is
   (A) Reduction roll (B) Hammer mill
   (C) Rubber roll (D) Attrition mill
4. The most efficient oil extraction process is :
   (A) Hydraulic Press (B) Mechanical Expression
   (C) Solvent Extraction (D) None of the above

Soil & Water Engineering:

1. At drop of less than 3 m, which of the following structures is recommended ?
   (A) Drop spillway (B) Chute spillway
   (C) Pipe spillway (D) Temporary check dam
2. When the speed of a centrifugal pump is changed, the head varies as :
   (A) Square of the speed (B) Square root of the speed
   (C) Cube of the speed (D) None of these
3. The natural grassed waterways are generally found in the shape of
   (A) Square (B) Triangular
   (C) Parabolic (D) Rectangular

4. In underground pipeline system the line terminates at

(A) Air vent (B) End plug

(C) Riser valve (D) Pump stand

Mathematics & Statistics:

1. The particular integral of the differential equation $y''-2y'=e^{x}+^{x}$ is

(A) x^2e^x (B) $2x+x^2e^x$

(C) $2+x+\frac{1}{2}x^2e^x$ (D) xe^x+4

MET - CE

(For admission to M.Tech. programme in Civil Engineering)

1. Test structure

(a) There will be 200 multiple choice type questions each of one mark to be attempted in allotted time of 3 hours.

(b) Each correct answer will **carry one mark** whereas ¼ **mark** will be **deducted** for every wrong answer,

(c) Minimum 20% marks are required in the Entrance Test to be called for Counselling/interview.

2. Syllabus

Force, moment, equilibrium, friction, moment of inertia, Simple stresses and strains, strain energy, shear force and bending moment, Direct and bending stresses, deflection, fixed and continuous beams, torsion, principal stresses and strains, thick and thin cylinders, columns and struts, rolling loads and influence lines, Design of various RCC and steel structural members. Laminar and turbulent flow, open channel flow, flow measurement, dimensional analysis. Hydrological cycle, hydrographs, stream flow, flood estimation, reservoir and channel routing. Duty, delta, evapo-transpiration, canals, waterways, head works, dams and spillways, irrigation methods. Index and engineering properties, consolidation, compaction, sub soil exploration, foundations. Surface and subsurface water resources, demand for water standards for potable water. Intake of water, Water treatment, storage and distribution. Domestic and industrial wastes, flow through sewers, sewer appurtenances, plumbing. Sewage characterization, standards of disposal, sewage treatment, recycling of waste water.

3. Model Questions

1. The loss of head due to sudden expansion in a pipe flow is given by
   (A) $f LV^2/(2gd)$ (B) $(V^2_2-V^2_1)/2g$
   (C) $(V_1-V_2)^2/2g$ (D) None of the above
2. For the upstream slope of an earth dam, the most critical condition is
   (A) Sudden draw down condition (B) Steady seepage condition
   (C) Neither sudden draw down nor steady (D) During construction when reservoir is allowed seepage to be filled
3. Garnett's diagrams are used for graphical solution of design equations of a canal by
   (A) Lacey's theory (B) Kennedy's theory
   (C) Gibb's theory (D) Lindlay Theory
4. The characteristic strength of concrete is defined as that compressive strength below which not more than
   (A) 10% of results fall (B) 5% of results fall
   (C) 2% of results fall (D) None of the above
5. Temporary hardness in water is caused by the presence of
   (A) Bicarbonates of Ca and Mg (B) Sulphates of Ca and Mg
   (C) Chlorides of Ca and Mg (D) Nitrates of Ca and Mg

MET - CSE

(For admission to M.Tech. programme in Computer Science and Engineering)

1. Test Structure

(a) There will be 200 multiple choice type questions each of one mark to be attempted in allotted time of 3 hours.

(b) Each correct answer will **carry one mark** whereas ¼ **mark** will be **deducted** for every wrong answer.

(c) Minimum 20% marks are required in the Entrance Test to be called for Counselling/interview.

2. Syllabus

Computer Fundamentals and Programming: Computer fundamentals, number systems, representation of integers, fixed and floating point numbers, character representation, Logic Gates and circuits. Functional units of computer, I/O devices, primary and secondary memories. Programming fundamentals with C/C++, loops, etc.

Operating System: Operating system overview, Operating system architecture. Process, process model, process scheduling, operations on process, inter process communication. Process synchronization, critical section problem, producer consumer problem, bounded buffer problem, CPU scheduling, long term schedulers, middle term schedulers, short term schedulers, basic concepts, scheduling criteria, scheduling algorithms, first come first serve, shortest job first, priority scheduling, round robin, multilevel queue, multilevel feedback, deadlocks, system model, race condition, deadlock prevention, deadlock avoidance, deadlock detection.

Data Structures and Algorithms: Programming design and development. Algorithms, programming constructs algorithm complexity, big O notation, and concept of recursion. Arrays and matrices, stack, stack insertion and deletion, queue, circular queues, priority queues, link list, Representation and processing of linear linked lists, bubble sort, selection sort, insertion sort, radix sort, merge sort algorithm, quick sort, heap sort, shell sort.

Data Base Management System: Overview of DBMS, basic DBMS terminology, advantages and disadvantages of DBMS, file approach and its limitations, DBMS approach, advantages of DBMS, DBMS components. Design, logical and physical data independence, three level architecture of DBMS, entities and types of entities, relationships, entity relationship model. Data models, relational model, network model, hierarchical model, comparison of data models. Relational model, Functional relational query language, SQL commands. PL/SQL, variables, control structures, decisions and loops, functions and procedures, cursors and triggers.

Internet and Web Technologies: Fundamentals of networking, overview of network topologies, classifications of networks. Advantages and disadvantages of internet, electronic mail, Introduction to HTML/DHTML Java script introduction, variables, control statements, JavaScript arrays, methods, client side validations, embedding JavaScript, future of JavaScript. Server side scripting.

3. Model Questions

1. Applying DeMorgan's theorem to the expression (A'B') C', we get
   (A) (A+B) + (C) (B) A (B+C)
   (C) Both A & B (D) None of the above
2. Express the decimal number 57 in binary
   (A) 100101 (B) 111010
   (C) 110010 (D) 111001
3. An organization has a class B network and wishes to form subnets for 64 departments. The subnet mask would be
   (A) 255.255.0.0 (B) 255.255.64.0
   (C) 255.255.128.0 (D) 255.255.252.0

4. The best data structure to check whether an arithmetic expression has balanced parentheses is a
   (A) Queue (B) Stack
   (C) Tree (D) List
5. Which BJT amplifier(s) has (have) a phase inversion between input and output signals?
   (A) Common-base (B) Common-collector
   (C) Common-emitter (D) All of the above

MET - MCA

(For admission to Master of Computer Appplications-3 years)

1. Test structure

(a) There will be 100 multiple choice type questions each of one mark to be attempted in allotted time of 1½ hours.

(b) The question paper shall have three sections as under:

Section - I : General English (20 questions)

Section - II : General Awareness (20 questions)

Section - III : Reasoning and Mental Ability (60 questions)

(c) Each correct answer will **carry one mark** whereas ¼ **mark** will be **deducted** for every wrong answer

(d) Minimum 20% marks are required in the Entrance Test to be called for Counselling/interview.

2. Syllabus

General English: Error Correction, Tenses, Sentence Rearrangement, Articles, Vocabulary, Idioms & Phrases, etc.

General Awareness: National/International awareness, Abbreviations, Awards & Honour, Sports, Country & Capital, etc.

Reasoning and Mental Ability: Number series, Coding-Decoding, Alphabet Series, blood relation, Shapes, Mirror Image, Insert missing character, Water images, Analytical reasoning, etc.

3. Model Questions:

General English

1. She (as well as) her sister is engaged:
   (A) Adverb (B) Adjective
   (C) Preposition (D) Conjunction
2. They usually spend their holidays in _____ mountains:
   (A) an (B) the
   (C) for (D) a

General Awareness

1. First President of India:
   (A) Dr Natwar Singh (B) Dr. Rajinder Prasad
   (C) Dr. RadhaKrishan (D) Dr. JakirHussain
2. There are _____ members of SAARC:
   (A) 5 (B) 6
   (C) 7 (D) 8

Reasoning and Mental Ability

1. What number should come next 7, 10, 8, 11, 9, 12, ...?
   (A) 7 (B) 10
   (C) 12 (D) 13
2. In a certain case INSTITUTION is written as NOITUTITSNI. How is PERFECTION written in that code:
   (A) NOICTEFREP (B) NOITCEFERP
   (C) NOITCEFREP (D) NOITCEFPER

MET - MCA

(For admission to MCA-Lateral Entry 2-year programme)

1. Test structure

(a) There will be 100 multiple choice questions to be attempted in allotted time of 1½ hours.

(b) Each correct answer will **Carry One Mark** whereas **¼ Mark** will be **deducted** for every wrong answer.

(c) Minimum 20% marks are required in the Entrance Test to be called for Counselling/interview.

2. Syllabus

Computer Basics: Organization of a Computer, Central Processing Unit (CPU), Structure of Instructions in CPU, Input/output devices, Computer Memory, Memory organization, back-up devices.

Data Representation: Representation of characters, integers and fractions, binary and hexadecimal representations, Binary Arithmetic: Addition, subtraction, division, multiplication, floating point representation of numbers, normalized floating point representation, Boolean algebra: truth tables, Venn diagrams.

Computer Architecture: Block structure of Computers, communications between processor and I/O devices, Interrupts.

Computer Language and Operating Systems: Flowcharts and algorithms, Concepts of low level and high level Languages, Computer Programming in C (data types, loop and control statements, functions), Fundamentals of operating systems: multiprogramming, multitasking and time sharing systems.

Concepts of Data Base Management System, Data Structures and Internet Web Technologies.

3. Model Questions:

1. An 8-bit unit of data is called:
   (A) Word (B) Data set
   (C) Byte (D) K
2. Pick the odd man out:
   (A) Internet Explorer (B) Windows Explorer
   (C) Netscape Navigator (D) Mosaic
3. Which of the following is not an operating system?
   (A) DOS (B) JAVA
   (C) LINUX (D) WINDOWS XP
4. The standard number of characters in the Extension of file name are:
   (A) 2 (B) 3
   (C) 4 (D) 5
5. The operator = = is
   (A) Assignment operator (B) Relational operator
   (C) Logical operator (D) None of the above

MET - AGRIBUSINESS

(For admission to MBA (Agribusiness) programme)

1. Test Structure

(a) The objective of this test is to measure the development of mental abilities and aptitude for studies in Agri-Business Management. The score of this test together with the score of group discussion and interview will determine the merit for admission to MBA Agribusiness programme in the University.

(b) There will be 300 multiple choice type questions each of one mark to be attempted in allotted time of 3 hours.

(c) There will be two parts of the Question Paper. Part-I will contain 60 questions each from Written Communication Ability, Numerical Ability and Management Aptitude, and Part-II will contain 120 questions of General Knowledge.

(d) The weightage of Part-I will be 60% and Part-II will be 20%. Group Discussion and Interview will have weightage of 10% each.

(e) Each correct answer will **carry one mark** whereas **¼ mark** will be **deducted** for every wrong answer.

(f) Minimum 20% marks are required in the Entrance Test to be called for Counselling/interview.

2. Model Questions

PART-I:

Written Communication Ability: The questions for the Written Communication Ability Test attempt to measure the communication skills of the students. This may include comprehension, vocabulary test, English usage, English structure, word usage, synonyms and antonyms etc. Some examples are given below:

1. Choose the word that has nearly the same meaning of the word given:

   METAMORPHOSIS

   (A) Transformation (B) Catharsis

   (C) Fossils (D) Violent explosion

2. Choose the word that has an opposite meaning of the word given:

   VILIFY

   (A) Sing the praise of (B) Show satisfaction with

   (C) Regard with distrust (D) Welcome with glee

3. Fill in the blanks:

   He managed to ..... several times, but was finally ..... by the police.

   (A) Absconded Kidnapped (B) Deceive Cheated

   (C) Cheat Robbed (D) Escape Arrested

Numerical Ability: The questions relating to Numerical Ability are to test student's proficiency in using the various numerical techniques. For example:

1. One metre is equal to:

   (A) 3.281 ft. (B) 3.126 ft.

   (C) 3.250 ft. (D) None of these

2. The cost of cultivating a square field at the rate of Rs. 160 per hectare is Rs. 1440/-. The cost of putting a fence around it at 75 paise per meter is:

   (A) Rs. 900/- (B) Rs. 18/-

   (C) Rs. 360/- (D) Rs. 810/-

Management Aptitude: It includes general aptitude of the candidate towards Agri-Business Management. For example:

1. NABARD is a/an

   (A) Manufacturing company
   (B) Export house
   (C) Financial institution
   (D) Teak Department

2. The term 'future and option' trading is associated with:

   (A) Capital market
   (B) Home furnishing market
   (C) Restaurant
   (D) Hotels

PART-II:

General Knowledge: It tests general awareness of the candidate from diversified areas such as Agriculture and allied sciences, Social Sciences, National and International Current Affairs. For example:

1. ICAR stands for

   (A) International Center for Agricultural Research
   (B) Institute for Central Agricultural Research
   (C) Indian Council of Agricultural Research
   (D) Indian Commodity of Agricultural Research

2. Which is the biggest oil consuming country in the world:

   (A) USA
   (B) UK
   (C) France
   (D) India

MET - BASIC SCIENCES

{For admission to M.Sc. programmes in Biochemistry, Botany, Microbiology, Zoology)

1. Test structure

(a) There will be 200 multiple choice type questions each of one mark to be attempted in allotted time of 3 hours.

(b) Each correct answer will **carry one mark** whereas **¼ mark** will be **deducted** for every wrong answer.

(c) Minimum 20% marks are required in the Entrance Test to be called for Counselling/interview.

2. Syllabus

Morphology and life history of important genera of algae, fungi, bacteria, viruses, lichens, bryophytes, pteridophytes and gymnosperms. Basic knowledge of anatomy, embryology and systematics of angiosperms. Economically important plants. Thermodynamics of plant water relationships, mineral nutrition, photosynthesis, nitrogen metabolism, translocation of photoassimilates, growth and growth hormones, photoperiodism, vernalization, senescence and aging, morphogenesis, dormancy, fruit growth and fruit ripening, abiotic stresses in plants. Cell structure and function Community structure and dynamics, ecosystem, biogeochemical cycles, pollution (air, water and soil), bioindicators, conservation and management of natural resources.

Animal classification and biosystematics. Comparative anatomy and physiology of invertebrates and vertebrates, Various aspects of developmental biology. Evolution, animal behaviour and ecology, Parasites and Parasitism. Pests and their management. Conservaton and management of fishery resources. Fish culture practices, induced breeding, fish diseases and their control, fish by-products and their use. Ecosystem and Biodiversity conservation.

Heredity and variation. Principles of inheritance. Gene interaction, Multiple allelism. Sex-linked, sex-influenced and sex-limited inheritance. Linkage, crossing over and chromosome mapping. Nature, structure and replication of genetic material. Gene structure, gene expression, genetic code and gene regulation Quantitative inheritance. Genes in populations. Speciation. Genetic engineering and biotechnology. Genetic disorders in man. Tissue culture and its applications.

Introduction and historical developments of Microbiology. General account of prokaryotic and eukaryotic cells. Microbial nutrition. Biology of viruses. Microbial interactions. Role of microbes in agriculture, food, dairy, pharmaceutical and other fermentation industries. Important microbial diseases of human.

Importance of Biochemistry; Concept of buffers in living system; Cell structure and function of biomolecules; structural organization of proteins and their sequencing, enzymes their general mechanism of action, classification, kinetics and regulation; concept of bioenergetics and respiratory chain, Concepts of intermediary metabolism and major pathyways. Role of vitamins. Principles of centrifugation, chromatographic, electrophoretic, spectrophotometric, immunological and radioisotopic techniques.

3. Model questions

1. The two heavy chains of immunoglobulins are joined by how many disulfide linkages
   (A) One (B) Three
   (C) Two (D) Four
2. Cells of aleurone layer contain
   (A) Fats (B) Starch
   (C) Protein (D) Sugars
3. Which one of the following is called Father of Genetics
   (A) J.D. Watson (B) G.J. Mendel
   (C) H.G. Khurana (D) M.S. Swaminathan
4. Nitrogen fixation is a process that require
   (A) *Energy* (B) *Anaerobic conditions*
   (C) *Aerobic conditions* (D) *Both A and B*
5. The skeletal ossicles of starfish arise from
   (A) Ectoderm (B) Mesoderm
   (C) Endoderm (D) None of these

MET - CHEMISTRY

(For admission to M.Sc. programme in Chemistry)

1. Test structure

(a) There will be 200 multiple choice type questions each of one mark to be attempted in allotted time of 3 hours.

(b) Each correct answer will **carry one mark** whereas ¼ **mark** will be **deducted** for every wrong answer

(c) Minimum 20% marks are required in the Entrance Test to be called for Counselling/interview.

2. Syllabus

Organic Chemistry - Aromatic, antiaromatic and non-aromatic compounds. Nucleophilic and electrophilic substitution in aromatic and aliphatic compounds Chemistry of various functional groups. Carbonyl compounds: Physical and chemical properties, Wittig, Perkin, Knovenaegel Cannizaros, Reformatsky reactions. Amines: Basicity of aromatic and aliphatic amines and their general physical and chemical properties. Amino acids and proteins.

Spectroscopy: Application of IR, NMR, UV spectroscopy and mass spectrometry in structure elucidation of simple organic compounds. Reaction mechanism involving reactive intermediates; carbanions, carbocations, free radicals and benzynes. Heterocyclics: Chemistry and reactions of five and six membered heterocyclics with one hetero atom., Natural Products: General introduction and chemistry of terpenoids, steroids, carbohydrates and alkaloids.

Inorganic Chemistry - Acids and Bases: Bronsted and Lewis concept of acids and bases. Molecular orbital approach: Linear combination of atomic orbitals, molecular orbital electronic configurations. p-Block elements, Chemistry of boron and aluminum compounds. Discovery and chemistry of noble gases. Transition metal chemistry: definition, d and f block transition elements, electronic configuration and general characteristics, comparison of the properties of metals of first transition series with 2nd and 3rd transition series. Origin of paramagnetism and diamagnetism. Magnetic susceptibility and Gouy's method. Ferromagnetism and anti ferromagnetism. Magnetic behavior of first row transition metal compounds. Qualitative idea of quenching of orbital contribution Spectral properties of transition metal compounds. Terms, symbols, coupling scheme (L-S), determination of energy states of d 2 configuration only. The electrostatic crystal field theory. CFSE, spectrochemcial series. Selection rules of electronic spectra. Nature of electronic transition in complexes with d^1-d^9 configurations in octahedral and tetrahedral fields (simple energy level orgel diagrams only). Metal carbonyls.

Physical Chemistry - Kinetic theory of gases, limitations, modifications and its applications. Chemical and ionic equilibria and its applications. Arrhenius and Debye Huckel theories. Adsorption theories and their applications. Classical and thermodynamic treatment of properties of pure liquids and solutions. Basic principles of kinetics of simple and complex reactions. Basic principles and applications of molecular spectroscopy viz. IR, NMR, UV, Microwave. Statistical mechanics and partition function. Basic concepts of quantum mechanics and its applications.

3. Model questions

1. Hoffmann's Bromamide reaction involves the intermediate

   (A) Carbene (B) Carbanion

   (C) Nitrene (D) Carbocation

2. Which of the following is most acidic in nature

   (A) Ethyl alcohol (B) Phenol

   (C) Ethane (D) Formaldehyde

3. The ground state of O_2 molecule is

   (A) Diamagnetic (B) Paramagnetic

   (C) Triple state (D) None of these

4. $Ni(CO)_4$ is

(A) Paramagnetic (B) Diamagnetic

(C) Ferromagnetic (D) Antiferromagnetic

5. How many layers are absorbed in chemisorption?

(A) Many (B) Two

(C) Zero (D) One

MET - JOURNALISM

(For admission to Master of Journalism and Mass Communication)

1. Test structure

(a) The objective of this test is to check general awareness, mental ability, English language and familiarity with the latest in the news.

(b) There will be 100 multiple choice questions each of one mark to be attempted in allotted time of one hour.

(c) There will be 4 parts in the question paper viz. Part I - General Awareness, Part II - Mental Ability, Part III - English, Part IV - Journalism. Each part will contain 25 questions.

(d) Each correct answer will **carry one mark** whereas ¼ **mark** will be **deducted** for every wrong answer

(e) Minimum 20% marks are required in the Entrance Test to be called for Counselling/interview.

2. Model Questions

Part I - General Awareness

1. Who is the Agriculture Minister of India?
   (A) Sharad Pawar (B) Pranab Mukherjee
   (C) Somnath Chatterjee (D) None of these
2. Which of the following UN programmes concentrates its assistance on development activities for improving the quality of life of children and mothers in developing countries?
   (A) UNEP (B) UNIDO
   (C) UNICEF (D) UNHCR

Part II - Mental Ability

1. 1,4,?,16,25,36. Determine the number after 4.
   (A) 6 (B) 9
   (C) 7 (D) 10
2. Taj Mahal : India : Leaning Tower of Pisa : ?
   (A) USA (B) Italy
   (C) Australia (D) Denmark

Part III - English

1. The most appropriate synonym of POLITY is ….
   (A) Courtesy (B) Trickery
   (C) Methods of government (D) Freedom
2. Choose an antonym of AMPLIFY:
   (A) Decrease (B) Multiply
   (C) Deceive (D) Bless

Part IV - Journalism

1. Legal protection for an intellectual work is called….
   (A) Cheesecake (B) Copyright
   (C) Centre Spread (D) Credit Line
2. Choose the full form of TRAI
   (A) Telephone Regularity Authority of India (B) Telephone Regulatory Association of India
   (C) Telecom Regulatory Appellate of India (D) Telecom Regulatory Authority of India

MET - MBA

(For admission to MBA programme)

1. Test Structure

(a) The objective of this test is to measure the development of mental ability and aptitude for studies in Business Management. The score of this test together with the score of group discussion and interview will determine the merit for admission to MBA programme in the University.

(b) There will be 300 multiple choice type questions each of one mark to be attempted in allotted time of 3 hours.

(c) The paper will be divided into four sections consisting of 60 questions each from Verbal Ability, Numerical Ability, Management Aptitude and 120 questions from General Knowledge. Each section will carry equal weightage i.e. 25%.

(d) The weightage for the Entrance Test will be 80%. Group Discussion and Interview will have weightage of 10% each.

(e) Each correct answer will **carry one mark** whereas **¼ mark** will be **deducted** for every wrong answer

(f) Minimum 20% marks are required in the Entrance Test to be called for Counselling/interview.

2. Model Questions

Verbal Ability: The questions for the Verbal Ability Test attempt to measure the communication skills of the students. This may include comprehension, vocabulary test, English usage, English structure, word usage, synonyms and antonyms etc. Some examples are given below:

1. Choose the best option to complete the conversation

   When can we meet again?

   (A) When you are free (B) It was two days ago

   (C) Can you help me (D) None of these

2. Choose the word that has an opposite meaning of the word given below:

   VILIFY

   (A) Sing the praise of (B) Show satisfaction with

   (C) Regard with distrust (D) Welcome with glee

Numerical Ability: The questions relating to Numerical Ability are to test student's proficiency in using the various numerical techniques. For example:

1. The simplification of $(2^{-1} – 3^{-1})$ is:

   (A) 1/6 (B) 6

   (C) 1 (D) 3

2. Two boys A and B start at the same time to ride from Delhi to Meerut 60 km away. A travels 4 km/hour slower than B. B reaches Meerut and at the same time turns back meeting A at a distance of 12 km away from Meerut. The speed of A was:

   (A) 4 km/hour (B) 8 km/hour

   (C) 12 km/hour (D) 16 km/hour

Management Aptitude: It includes general aptitude of the candidate towards Agri-Business Management. For example:

1. SEBI is;

   (A) A manufacturing organization (B) Regulatory body

   (C) Export house (D) Financial institution

2. The term 'interest rate futures' is associated with:

(A) Capital markets (B) Home furnishing market

(C) Hotels (D) Spot trade

General Knowledge: It tests general awareness of the candidate from diversified areas such as Agriculture and allied sciences, Social Sciences, National and International Current Affairs. For example:

1. UGC stands for

(A) Universal grants commission (B) University grants commission

(C) Undergraduate grants commission (D) University generals commission

2. Which is the biggest Oil producing country?

(A) USA (B) Russia

(C) Saudi Arabia (D) Iran

MET - PHYSICS

(For admission to M.Sc. programme in Physics)

1. Test structure

(a) There will be 200 multiple choice type questions each of one mark to be attempted in allotted time of 3 hours.

(b) Each correct answer will **carry one mark** whereas ¼ **mark** will be **deducted** for every wrong answer.

(c) Minimum 20% marks are required in the Entrance Test to be called for Counselling/interview.

2. Syllabus

Quantum mechanics: Origin of quantum mechanics; Wave functions and the ScrÖdinger equation, group velocity, Uncertainty principle; Operators, Eigen values and Eigen functions-Gaussian wave packet, Ehrenfest theorem; Solutions of time independent ScrÖdinger equation, one dimensional box, step potential, potential barrier, harmonic oscillator, Hydrogen atom; Atoms with one and many electrons, Fine structure of hydrogen and sodium, electron spin, angular momentum, SG experiment.

Electricity & Magnetism: Vector algebra; Coulomb's law and electric field; Gauss's law and its applications; Electric potential and current; Fields of moving charges; Magnetic field; Electromagnetic induction; Electric field in dielectric; Magnetic field in matter; Wave motion; Electromagnetic waves.

Electronics: Junction diode, zener diode, Tumnnel diode; LED, LCD; Rectification-Half and full wave rectifier; Filter circuits, voltage regulation; Junction transistor, structure and working; Characteristics of JFET; Transistor biasing, working of common emitter amplifier; Analysis using h-parameters; FET amplifier; Feedback amplifiers; Oscillators-LC and RC oscillators.

Statistical Physics: Basic Ideas; Maxwell-Boltzmann Statistics, law of distribution of molecular speeds; B-E and F-D statistics. Wein's displacement law and Stefen's law; Statistical interpretation of entropy and Carnot's cycle, equation of state; Maxwell's thermodynamic relations and their applications.

Mechanics: Co-ordinate systems and motion of a particle; Relationship of space time symmetries and conservation laws; Relativity: Special theory of relativity, Lorentz transformations, simultaneity principle, length contraction and time dilation, relativistic addition of velocities, mass energy equivalence, Minskowski space; Elastic and Inelastic collisions; Frames of references; Hamilton's principle.

Nuclear Physics: Constituents of nucleus and their intrinsic properties. Properties of nuclear forces, Liquid drop model, Nuclear shell model, Radioactive decays, alpha, electron, positron and gamma ray emission; Nuclear reactions; Interaction of gamma rays with matter; Cyclotron; Betatron; Linear accelerator; Ionization chamber; proportional Counter; GM counter; Scintillation counter; elementary particles-classification; Conservation laws; quark-model.

Solid State Physics: Crystal structure: Two and three dimensional bravais lattices, miller indices, diamond and sodium chloride structure; Crystal diffraction-Bragg's law, Laue's equation, reciprocal lattices of SC, BCC and FCC structures; Lattice vibrations, Einstein and Debye model of specific heat; Free electron model of metals, Fermi gas and Fermi energy; Band theory, Brillouin Zones, Kroning Penny model; Metals and insulators; Superconductivity, Properties of Magentic materials.

3. Model questions

1. An oscillator is nothing but an amplifier with:
   (A) Positive feedback (B) Negative feedback
   (C) No feedback (D) Large gain
2. Photon is a quantum of energy of:
   (A) Electromagnetic energy (B) Elasic energy
   (C) Magnetic energy (D) Electrostatic energy

3. The number of atoms in a unit cell of an fcc structure (with lattice constant) is

(A) One (B) Four

(C) Two (D) Ten

4. An accelerator which cannot accelerate protons is:

(A) linear accelerator (B) Cyclotron

(C) Betatron (D) Van de Graff generator

5. Nuclear cross section has the dimensions of:

(A) Area (B) Length

(C) Volume (D) Density

MET - SOCIOLOGY

(For admission to M.Sc. programme in Sociology)

1. Test Structure

(a) There will be 200 multiple choice type questions each of one mark to be attempted in allotted time of 3 hours.

(b) The question paper shall have two sections as under:

Section I: General Agriculture (Code AG) or General Home Science (Code HS). This section will carry 100 questions with 30% weightage. The candidate can attempt either General Agriculture (Code AG) or General Home Science (Code: HS).

Section II: Sociology. This section will carry 100 questions with 70% weightage.

(c) Each correct answer will carry one mark whereas ¼ mark will be deducted for every wrong answer.

(d) Minimum percentage of marks required to be obtained in the Entrance Test to be called for Counselling is 20% with negative marking.

2. Syllabus

Section I:

General Agriculture (Code: AG)

Issues facing modern day agriculture in Punjab. Principles of crop production. Improved varieties, cultural practices, major pests and diseases (and their control) of wheat, rice, cotton, sugarcane, pulses, oilseeds and important vegetables, fruits and ornamentals of Punjab. Importance, status and scope of fruit industry in Punjab. Importance and classification of vegetable crops in Punjab. Breeding method of self-pollinated, cross pollinated and vegetatively propagated crops. Seed certification. Principles of agroforestry. Scope of floriculture and landscaping in Punjab. Functions and deficiency symptoms of micro and macronutrients. Problematic soils, their characteristics and management. Improved irrigation practices in field and horticultural crops. Water resources of Punjab state. Organic manures, inorganic and biofertilizers. Handling, processing and preservation of foods of plant and animal origin. Fundamentals of agricultural business and marketing. Extension education in relation to rural development and precision farming. World trade in agriculture, commodities, quarantine, SPS measures and IPRs.

General Home Science (Code: HS)

Food, food groups and their functions. Balanced diet. Effects of cooking on food. Principles of nutrition. Recommended Dietary Allowances. Deficiency diseases. Meal planning. Therapeutic Nutrition. Heredity and environment; growth and development. Principles of growth and development. Developmental tasks. Meaning, need, importance, and scope of early childhood education. Puberty and pubertal changes. Early and late maturation. Meaning and classification of children with special needs. Concept of special education. Marriage, its types and functions. Family and its functions. Stages of family life cycle. Extension education. *Panchayati raj* institutions. Indian Council of Agricultural Research. Teaching, learning and teaching-learning process. Projected, non-projected, electronic and folk media. Instructional strategies/techniques. Communication process. Diffusion and adoption process. Opinion leaders/ change agents. Extension training. Programme planning. Participatory rural appraisal techniques. Basic textile and clothing construction terminology. Yarn classification and uses. Basic finishes. Basic weaving and knitting terminology. Different types of looms and weaves. Design elements and principles of clothing and apparel designing. Clothing selection and wardrobe planning. Dyeing and printing process. Common dyeing and printing defects. Concept and principles of management, management process, work, work environment, work simplification, fundamentals of housing, principles of design and home furnishing, selection, care and maintenance of household equipment and furniture, family finance and consumer education. Functional interiors for special needs.

Section-II:

Sociology: definition, nature and scope. Relationship of sociology with other social sciences: psychology,

economics, history, anthropology. Basic concepts: society, community, neighbourhood, social group and its types, association, organization, institution, social role, social status, social stratification and its basis, socialization, social system and its elements. Social processes: cooperation, accommodation, assimilation, competition and conflict. Culture, its types and attributes. Social values and their role in society. Norms & its types (folkways, mores and laws). Social control: concept and agencies of social control. Social change: its dimensions and factors. Basic social institutions: family, marriage, economics and political (Panchayati raj system). Rural sociology and its aim. Characteristics of rural society, Physical structure of rural society. Rural-urban differences. Green revolution. Rural social problems: poverty, indebtedness, drug addiction.

Model Questions

1. Primary and secondary group typology was given by:
   (A) W.G. Sumner (B) C.H. Cooley
   (C) F. Tonnies (D) H.P. Fairchild
2. Restriction on beef eating in Hindu society is:
   (A) Idea (B) Taboo
   (C) Tradition (D) Belief

MET - STATISTICS

(For admission to M.Sc. programme in Statistics)

1. Test structure

(a) The question paper will have to be attempted in 3 hours.

(b) There will be two sections in the paper as under:

Section-I (for students of B.Sc. Non-Medical and B.A. with Mathematics). This section will carry 100 questions of two marks each.

Section-II (for students of B.Sc. with Statistics and B.Sc. CSM). This section will carry 150 questions

(50 questions of two marks each and 100 questions of one mark each)

Choice of Section-I or Section-II will have to be given at the time of submitting application form at Sr. No. 6. Choice once selected will not be changed later on.

(c) Each correct answer will carry two marks / one mark whereas ½ / ¼ mark (as applicable) will be deducted for every wrong answer.

(d) Minimum 20% marks are required in the Entrance Test to be called for Counselling/interview.

2. Syllabus

SECTION – I (MATHEMATICS)

Countable and uncountable sets, Riemann integral, Mean value theorems of integral calculus, Improper integrals and their convergence, Comparison tests, Abel's and dirichlet's tests, Beta and gamma functions, Double and triple integrals, Fourier series.

Groups, Vector Spaces, Linear transformations, Matrices and linear transformations.

Probability theory, Bayes' theorem, Random variables, Expectation, Mean, Variance, Moment generating function, Distributions: Binomial , Geometric , Poisson , Uniform , Exponential , Gamma and Normal.

Secant, Regula falsi, Newton's method, Interpolation: Lagrange and hermite interpolation, Numerical differentiation, Numerical quadrature, Direct methods for solving systems of linear equations, Runge-Kutta's method.

Sequence and series, Infinite series, vector calculus and its applications, Continuity, Sequential continuity, Uniform continuity, Limit and continuity of functions of two and three variables, Partial differentiation and its applications.

Exact differential equations, of first order and first degree; first order and higher degree, Orthogonal trajectories, Linear differential equations with constant coefficients

SECTION – II (STATISTICS)

Classification, tabulation and presentation of data, population, sample, Measures of location, Dispersion, Skewness and kurtosis, Two dimensional random variable, Joint probability distributions, Marginal and conditional probability distributions, Conditional expectation, Measures of association and contingency, Correlation and simple linear-regression, Coefficient of determination, Spearman's rank correlation coefficient, Multiple and partial correlation in three variables, Multiple regression.

Probability, Bayes' theorem and its applications, Random variable, Probability mass function, Probability density function, Distribution function and its properties, Moment generating function, Two dimensional random variables: Joint, Marginal, Conditional distributions, Uniform, Binomial, Poisson, Normal, Exponential, Gamma and Beta distributions, Chebyshev's inequality and its applications, Weak law of large numbers, Central limit theorem.

Point and interval estimation, Unbiasedness, Consistency, Efficiency and sufficiency, Methods of moments, Maximum likelihood estimators for the parameters of Binomial, Poisson and normal distributions, Confidence intervals, Hypothesis testing, Sampling distributions of Chi-square, t & F distributions and their relationships, Large

and small sample tests, Testing of correlation coefficient, Fisher's Z-transformation, Chi-square test for goodness of fit and independence of attributes.

Census and sample surveys, Basic concepts in sampling, sample size, Sampling methods for estimation of population mean, variance and standard error of estimates : simple random sampling (SRS), Stratified random sampling and systematic sampling. Fixed, random and mixed effects models, Analysis of variance for one-way and two-way classifications under the fixed effect models, Fundamental principles of design, CRD, RBD, LSD and their analysis.

Limits and continuity, Derivatives and their applications, Exponential and logarithmic functions, Integration and their applications, Definition of an angle its various measures and relations between them, Circular functions.

The solution of linear and quadratic equations in one variable, Arithmetic, Geometric and harmonic progressions, Permutations and combinations, Principle of induction, Binomial theorem for positive integral index.

3. Model Questions

Section –I

1. The sum of the series

$$\frac{1}{1!}+\frac{1+2}{2!}+\frac{1+2+3}{3!}+\cdots$$

(A) e (B) e/2
(C) 3e/2 (D)1+e/2

2. The row space of a 20 X 50 matrix A has dimension 13. What is the dimension of the space of solutions of AX=0?
   (A) 7 (B) 13
   (C) 37 (D) 33
3. Up to isomorphism, the number of abelian groups of order 108 are:
   (A) 12 (B) 9
   (C) 6 (D) 5

Section-II

1. Which one of the following is true?
   (A) The sample mean is always less than the population mean.
   (B) The sample mean is always more than the population mean.
   (C) The sample mean is an unbiased estimate of population mean.
   (D) None of the above is true.
2. If 'O' and 'E' be the observed and expected frequencies, then the χ^2 is equal to:
   (A) $\sum\frac{(O+E)^2}{N}$ (B) $\sum\frac{(O-E)^2}{E}$
   (C) $\sum\frac{(O+E)^2}{E}$ (D) None of the above.
3. Numerical value of correlation coefficient r can never be:
   (A) Greater than unity (B) Less than unity
   (C) Greater than zero (D) None of the above

MET - FASHION DESIGNING

(For admission to M.Sc. programme in Fashion Designing)

1. Test structure

(a) The question paper will have to be attempted in 3 hours.

(b) Candidates will attempt 200 multiple choice type questions each of one mark, based on general aptitude of fashion designing.

(c) Each correct answer will **carry one mark** whereas ¼ **mark** will be **deducted** for every wrong answer

(d) Minimum 20% marks are required in the Entrance Test to be called for Counselling/interview.

2. Syllabus

Basics of design composition and dynamics of fashion. Organizational set up of an apparel industry and its departments. Pattern making, garment construction, draping and grading Industrial sewing machine, its parts and use. Textile fibers and yarns. Woven and knitted structures. Dyeing, printing and finishing. Indian costumes, traditional textiles and embroideries of India. Costumes of the world. Merchandising fashion and retail marketing. Quality control. Apparel production technology. Green technologies in apparel manufacturing and fashion communication. Supply chain management and logistics.

3. Model Questions

1. The measure of thickness or thinness of a yarn is called:
   (A) Yarn crimp (B) Yarn count
   (C) Yarn twist (D) Yarn blend
2. Pop-up retail stores are also called:
   (A) Temporary stores (B) Departmental stores
   (C) Discount stores (D) Mom and Pop stores
3. Which of the following is not a lead firm in an apparel value chain?
   (A) Customer (B) Wholesaler
   (C) Marketer D) Manufacturer
4. Which of the following can be used for protein fibers?
   (A) Basic dyes (B) Sulphur dyes
   (C) Acid dyes (D) Vat dyes
5. Sheer fabrics are woven in which weave:
   (A) Rib weave (B) Basket weave
   (C) Dobby weave (D) Plain weave

MET - HOME SCIENCE

(For admission to M.Sc. programmes in Apparel & Textile Science, Family Resource Management, Food & Nutrition, Extension Education & Communication Management, Human Development & Family Studies)

1. Test Structure

(a) The question paper shall have two SECTIONS:

SECTION - I: General Home Science, which will be compulsory for all the candidates.

SECTION - II: A candidate has to opt for at least one discipline out of the following. However, a maximum of two disciplines can be selected as per candidate's eligibility:

1. Apparel & Textile Science
2. Family Resource Management
3. Food & Nutrition
4. Extension Education & Communication Management
5. Human Development & Family Studies

Any change in choice of discipline will not be allowed after the submission of application form.

(b) There will be 150 multiple choice type questions **(SECTION - I: 90; SECTION - II: 60)** each carrying one mark which are to be attempted by the candidate in the allotted time of **2 hours 10 minutes**.

(c) Candidate appearing for two disciplines will be required to sit for **additional SECTION-II** paper chosen by him/her consisting of **60 questions** to be attempted in additional allotted time of **50 minutes**.

(c) Each correct answer will carry one mark whereas ¼ mark will be deducted for every wrong answer

(d) Minimum percentage of marks required in the Entrance Test to be called for Counselling is 20% with negative marking.

2. Syllabus

Section I

General Home Science

Food and its functions. Food groups and nutrients. Concept and components of balanced diet. Composition and nutritive value of foods. Effect of cooking on the nutritive value of food. Basic principles of nutrition. Recommended Dietary Allowances. Body composition. Classification, functions, sources, requirements and deficiency/excess of carbohydrates, fats, proteins, vitamins and minerals. Principles and methods of food preservation. Food standards and quality control. Assessment of nutritional status. Major nutritional problems prevalent in India and Punjab- Protein Energy Malnutrition, Anaemia, Vitamin A deficiency, Iodine Deficiency Disorders and Fluorosis. National nutrition programmes and policies. Meal planning - principles, menu planning for normal individuals of different age groups. Therapeutic Nutrition and its importance. Planning of therapeutic diets in various diseases.

Basic concepts- heredity and environment, growth and development, maturation and learning. Principles of growth and development. Physical, cognitive, social and emotional development during different stages of human life cycle. Developmental tasks. Meaning, need, importance, and scope of early childhood education. Puberty and pubertal changes. Early and late maturation. Concept of adulthood and aging. Adjusting to occupational transitions and retirement. Piaget's stages of cognitive development. Kohlberg's stages of moral development. Psycho-analytical stages of development as given by Freud and Erikson's psycho-social stages of personality development. Children with special needs. Concept of impairment, disability, handicap and special education. Definition, purpose, types and functions of marriage. Definition, nature and functions of family. Concept and stages of family life cycle. Factors responsible for the changing structure of the modern family.

Extension education- concept, need, importance, principles and objectives. Concept and need of rural development. *Panchayati raj* institutions- concept, structure and functions. Indian Council of Agricultural Research,

State Agricultural Universities and their role in rural development. Concept of teaching, learning and teaching-learning process. Projected, non-projected, electronic and folk media. Instructional strategies/techniques. Communication- elements, types, functions and barriers. Diffusion and adoption- adoption process, rate of adoption and adopters categories. Innovation and innovation- decision process, Opinion leaders/ change agents. Extension training- importance, principles, training needs, adult learner and their characteristics, qualities of good trainer. Management of extension training- monitoring, evaluation and management of group behaviour. Programme planning and steps involved in it. Participatory rural appraisal techniques.

Clothing construction terminology. Equipment and accessories used in clothing construction, their care and use. Methods of garment construction. Basic textile terminology, textile fibres and their classification. Properties and use of natural and synthetic fibres. Yarn classification and uses. Fabric construction techniques. Basic finishes and their application. Basic weaving and knitting terminology. Woven and knitted structures. Conventional loom and its parts. Different types of weaves. Principles and classification of knitting. Stitches used in knitting. Types of knitted fabrics. Application of design elements and principles of clothing and apparel designing. Factors affecting clothing selection and wardrobe planning for various age groups. Terminology used in dyeing and printing. Types and methods of dyeing fibres, yarns and fabrics. Styles and methods of printing. Common dyeing and printing defects. Principles and methods of washing and finishing. Principles, classification and techniques of stain removal. Role of water, soaps and detergents as cleaning agents. Bleaching, blueing and stiffening agents.

Home Management/Family Resource Management - Concept and principles of management, management process, work, work environment, work simplification, fundamentals of housing, principles of design and home furnishing, selection, care and maintenance of household equipment and furniture, family finance and consumer education. Functional interiors for special needs.

Section II

Apparel & Textile Science

Organisational set up of an apparel industry. Role of various departments of apparel industry in apparel manufacturing. Terminology used in fashion industry. Fashion illustration and design development through CAD. Introduction to standards and specifications. Importance of apparel standards and quality control. Types of machines, accessories and ancillaries used in apparel manufacturing. Different methods of pattern making, grading and dress designing. Fitting problems and their remedies. Traditional textiles and embroideries of India. Costumes of different states of India. Surface decoration techniques used in textiles. Fashion retailing, merchandising and forecasting. Effect of fashion cycle on retailing. Sales promotion techniques.

Family Resource Management

Material used for furniture, types of furniture, their selection and furniture arrangement. Selection, care and maintenance of hard floor material, soft floor coverings and resilient floor materials. Exterior and interior wall materials, types of windows and window treatments. Types of flower arrangements and application of colour in interiors. Historic overview of interior design and Indian handicrafts. Types of accessories, their selection and placement.

Food & Nutrition

Physical, chemical and nutritional changes during processing of food. Food hygiene and sanitation. Food toxins. Food related laws and quality control. Food product development and packaging. Institutional food management. Planning, organizing and controlling the bakery and confectionary unit. Etiology, metabolic changes, clinical manifestation, complications and dietary management of metabolic and lifestyle diseases. Sports nutrition.

Extension Education & Communication Management

Functions, types, models, levels and barriers of communication. Communication effectiveness and efficiency. Principles, types, importance, impact, composition and tools of photographs. Types of cameras. Traditional versus digital photography. Models and principles of instructional designing. Video production. Public relations. Need,

importance and philosophy of social marketing. Importance of training for HRD. Training needs and training methods. Designing, executing and evaluating training programmes. Entrepreneurship as a dimension of HRD. Project management, planning, lifecycle and budgeting. Project tracking and reporting. Types of enterprises. Phases of entrepreneurship development. Multimedia process, types, components and tools.

Human Development & Family Studies

Need, significance and role of environmental stimulation in optimization of development in children. Screening and measurement concepts, tools and techniques of assessment. Importance of developmentally appropriate programme planning. Characteristics, need, functions and types of project planning in early childhood care and education programme. Principles of and approaches to guidance and counselling. Child and family welfare services in India. Parent education and parent involvement - techniques, methods, programmes and benefits. Types and sources of creativity. Dramatic and rhythmic activities for children. Basic elements and role of drama in overall development. Principles of developing literature for different age groups. Children's play.

3. Model Questions

Section I:

General Home Science

1. Sodium in the body is present in:
   (A) Extracellular fluid (B) Intracellular fluid
   (C) None (D) Both
2. Jean Piaget is known for his contribution to:
   (A) Physical development (B) Social Development
   (C) Cognitive development (D) Emotional development

Section II:

Apparel & Textile Science

1. Denim is an example of:
   (A) Plain weave (B) Rib weave
   (C) Twill weave (D) Basket weave
2. The quality of the final garment depends upon:
   (A) Construction (B) Finishing
   (C) Inspection (D) All of the above

Family Resource Management

1. Which of the following flooring material is not natural?
   (A) Brick (B) Marble
   (C) Mosaic (D) Linoleum
2. This type of blind pulls up with a cord into accordion folds and are particularly suited to some traditional interiors.
   (A) Slat blinds (B) Roller blinds
   (C) Austrian blinds (D) Venetian blinds

Food & Nutrition

1. HACCP principles are most widely applied to:
   (A) Chemical hazards (B) Microbiological hazards
   (C) Physical hazards (D) All of the above

2. The goal of every food service established is to make :

(A) Sales (B) Preparations

(C) Profits (D) Money

Extension Education & Communication Management

1. The process by which a communicator ciphers a message:

(A) Decoding (B) Encoding

(C) Understanding (D) Communication fidelity

2. The part of camera that controls the amount of the light entering the camera:

(A) Shutter (B) ASA

(C) Screen (D) Lenses

Human Development & Family Studies

1. The appropriate disciplinary technique used by parents for a school age child should be:

(A) Authoritative (B) Permissive

(C) Democratic (D) Over protective

2. The fact that an infant's head and upper body develop before the lower body, it illustrates the :

(A) Cephalocaudal principle (B) Integrational principle

(C) Maturational principle (D) Proximodistal principle