

# PET – AGRICULTURE

## AGRONOMY

### 1. Test Structure

- (a) The question booklet will have two parts: **Part-A** and **Part-B** to be attempted in 3 hours. Weightage for Part-A and Part-B will be 60% and 20%, respectively.
- (b) Part-A will carry 150 multiple choice questions (MCQs) to be attempted on the OMR sheet. Each correct answer will **carry one mark** whereas 1/4 **mark** will be **deducted** for every wrong answer.
- (c) Part-B will contain two subjective type questions to be attempted in the space provided along with the questions in the question booklet.
- (d) Minimum 20% marks are required in the Entrance Test to be called for Counselling / Interview in Part-A and Part-B, individually.
- (e) Merit list will be prepared on the basis of:
  - i) Performance in the Entrance Examination 80% (60% MCQ + 20% subjective)
  - ii) Master's Research by Thesis & Quality of Thesis 10%
  - iii) Interview 10%

### 2. Syllabus

Integrated farming, Organic farming, Resource conservation technologies, Crop residue management, Dry land farming, Physiology of grain yield in cereals, Precision agriculture, Remote sensing for yield forecasting. Commercial fertilizers, Organic manures, Fertilizer use efficiency, Nutrient interactions, Integrated nutrient management. Weed biology, ecology, Crop weed competition, Classification of herbicides, their selectivity and mechanism/ mode of action. Weed management in major field crops. Herbicide resistance. Soil –water- plant relationship. Factors determining water needs, Scheduling and methods of irrigation. Quality of water. Drainage, Excess water and water stress, their effect on plant growth, Fertigation, Water use efficiency, Transpiration, Absorption. Planning and conduct of field experiments, Recording biometrical observations, Experimental designs, Compilation, Presentation and interaction of data. Correlation and response functions. Transformation.

### 3. Model Questions

1. The production potential of a particular crop depends on:  
(A) Fertilizer (B) Seed  
(C) Irrigation (D) All of these
2. How many source of variation are there in 20 treatment CRD design?  
(A) 5 (B) 2  
(C) 40 (D) 19
3. Salinity stress in plant is often called as:  
(A) Biological drought (B) Physiological drought  
(C) Hydrological drought (D) Agronomic drought
4. Excess fertilizer application results in:  
(A) Normal vegetative growth (B) Poor vegetative growth  
(C) Better environment for diseases (D) Stunted growth
5. Test weight (1000-seed weight) of *Phalaris minor* is:  
(A) 2 g (B) 10 g  
(C) 4 g (D) 15 g

# PET – AGRICULTURE

## EXTENSION EDUCATION

### 1. Test Structure

- (a) The question booklet will have two parts: **Part-A** and **Part-B** to be attempted in 3 hours. Weightage for Part-A and Part-B will be 60% and 20%, respectively.
- (b) Part-A will carry 150 multiple choice questions (MCQs) to be attempted on the OMR sheet. Each correct answer will **carry one mark** whereas 1/4 **mark** will be **deducted** for every wrong answer.
- (c) Part-B will contain two subjective type questions to be attempted in the space provided along with the questions in the question booklet.
- (d) Minimum 20% marks are required in the Entrance Test to be called for Counselling / Interview in Part-A and Part-B, individually.
- (e) Merit list will be prepared on the basis of:
- |   |                                |
|---|--------------------------------|
| i) Performance in the Entrance Examination          | 80% (60% MCQ + 20% subjective) |
| ii) Master's Research by Thesis & Quality of Thesis | 10%                            |
| iii) Interview                                      | 10%                            |

### 2. Syllabus

Principles and philosophy of extension education. Adult education and distance education. Analysis of Indian agricultural extension systems of ICAR, SAU, State departments and non-government organizations. Rural development programmes. Decentralized decision making, bottom-up planning. Farming system approach. Market led extension. Farm field school. Agricultural Technology Information Centre, Kisan Call Centres, National Agricultural Innovation Project. Models, theories, types and factors affecting communication. Communication skills. Key communicators. Expert system. Role of ICT in communication. Social networks and development. Effective oral communication, public speaking, and non-verbal communication. Development communication. Organizational communication. Recent advances in communication. Importance of planning, participatory planning. Cooperative, democratic, bottom up and down planning. Project management techniques, SWOT analysis. Formation of SHGs, their implementation and evaluation. Diffusion and adoption processes and their consequences. Role of change agents in diffusion and adoption. Opinion leaders. Theories, process and factors influencing decision making. Scientific methods in extension education. Designs in social and educational research. Selection and formulation of research problem. Hypotheses, constructs and variables, levels of measurement. Sampling and data collection techniques. Reliability and validity of scales. Content analysis and projective techniques. Functions, systems of human resource development. Collective bargaining and negotiation skills for human resource management. Information management. Stress and coping mechanisms. Team building. Leadership styles, group dynamics. Methods of training. Training need assessment, evaluation and development strategies.

### 3. Model Questions

- Which training method does not improve inter-personal competence?  
(A) Sensitivity training (B) Role playing  
(C) Case study (D) Transactional analysis
- Programme development is a process that follows the:  
(A) Setting up priorities to different educational activities (B) Systematic process of preparing plan of work  
(C) Planning, implementing and evaluating educational activities (D) Evaluation of inputs, outputs and impacts
- A good extension programme can only be developed by integrating:  
(A) Felt needs of the farmers (B) Knowledge and insight from farmers and extension agents  
(C) Knowledge and skill of the farmers (D) Knowledge and insight of the extension agents
- Participatory planning is a:  
(A) Linear activity (B) Sequential activity  
(C) Formal activity (D) None of these
- SWOT is basically a tool for:  
(A) Decision making (B) Leading  
(C) Controlling (D) Motivating

# PET – AGRICULTURE

## ENTOMOLOGY

### 1. Test Structure

- (a) The question booklet will have two parts: **Part-A** and **Part-B** to be attempted in 3 hours. Weightage for Part-A and Part-B will be 60% and 20%, respectively.
- (b) Part-A will carry 150 multiple choice questions (MCQs) to be attempted on the OMR sheet. Each correct answer will **carry one mark** whereas **1/4 mark** will be **deducted** for every wrong answer.
- (c) Part-B will contain two subjective type questions to be attempted in the space provided along with the questions in the question booklet.
- (d) Minimum 20% marks are required in the Entrance Test to be called for Counselling / Interview in Part-A and Part-B, individually.
- (e) Merit list will be prepared on the basis of:
- |   |                                |
|---|--------------------------------|
| i) Performance in the Entrance Examination          | 80% (60% MCQ + 20% subjective) |
| ii) Master's Research by Thesis & Quality of Thesis | 10%                            |
| iii) Interview                                      | 10%                            |

### 2. Syllabus

Evolution of insect body form. Comparative morphological characteristics of insects and their bearing in insect classification. Insect sense organs. Mechanism of flight. Insect Systematics - history and importance. Zoo-geographical regions of world. History of insect classification and its importance. Taxonomic keys and categories. Important rules of Zoological Nomenclature. Classification of super class Hexapoda with emphasis on class Insecta up to economically important families along with their distinctive morphological and ecological characteristics. Structure and physiology of insect integument. Comparative study of anatomy and physiology of digestive, circulatory, respiratory, excretory, reproductive, nervous, sensory, endocrine and exocrine systems. Embryonic and post-embryonic developments. Diapause. Insect nutrition. Artificial diets. Basic concepts of ecology, organization levels, ecosystem concept, food chain. Characteristics of insect populations. Concept of intrinsic rate of increase. Biotic factors, intraspecific competition, logistic theory. Interspecific relationships, prey/predator models, effect of food and space on insects. Natural balance, population dynamics and regulation. Life tables. System approach to ecology. Pest outbreaks and forecasting. Sampling considerations for population estimates. Pest management as applied ecology. Importance, scope, basic principles of insecticide toxicology. Structure and mode of action of organochlorines, organophosphates, carbamates, synthetic pyrethroids, neonicotinoids, oxadiazines, phenyl pyrazoles, botanicals, etc. Bioassay, joint action, synergism, potentiation and antagonism. Insecticide metabolism. Pest resistance to insecticides. Insecticide Act. Safe use of insecticides, diagnosis and treatment of poisoning. Pesticide residues, their significance and environmental implications. Techniques in biological control. Biology and host seeking behaviour of predatory and parasitic groups of insects. Role of insect pathogens and their mode of action. Mass production of biocontrol agents. Importation of natural enemies and quarantine regulations. Biotechnology in biological control. Semiochemicals in biological control. Host plant resistance. Principles, classification, components, types and mechanisms of resistance. Screening techniques. Breeding for insect resistance in crop plants. Exploitation of wild plant species and gene transfer. Determination of crop losses and economic thresholds. Integration of different pest management methods. Pest survey and surveillance, forecasting, types of surveys including remote sensing methods, factors affecting surveys. Classification of bees and distribution of genus *Apis*, morphological adaptations. Behaviour and activities of honey bees. Honey bee nutrition. Artificial queen bee rearing and bee breeding. Sex and caste determination. Honey bee ecology. Bee pheromones. Pests and diseases of honey bees. Hive products. Planned crop pollination using bees. Silkworms and their rearing and management. Pests and diseases of silkworms. Lac insect's management. Insect-pests of stored grain and agricultural products, identification, distribution, host range, biology, nature and extent of damage and management. Type of storage structures. Ideal storage conditions.

### 3. Model Questions

1. Who proposed the broad classification of Animal Kingdom?  
(A) Linnaeus (B) Aristotle (C) Hymen (D) Huxley
2. The Lepidopteran family which has only 4 functional legs in adult stage:  
(A) Arctiidae (B) Nymphalidae (C) Noctuidae (D) Gelechiidae
3. Juvenile hormone is secreted by:  
(A) Neurosecretory cells (B) Prothoracic cells  
(C) Corpora allata (D) Corpora cardiaca
4. Distribution pattern of insect population is also called:  
(A) Spread (B) Dispersal  
(C) Migration (D) None of these
5. Which of the following is a cyclodiene compound?  
(A) Endosulfan (B) Endrin  
(C) Heptachlor (D) All of these

# PET – AGRICULTURE

## FOOD TECHNOLOGY

### 1. Test Structure

- (a) The question booklet will have two parts: **Part-A** and **Part-B** to be attempted in 3 hours. Weightage for Part-A and Part-B will be 60% and 20%, respectively.
- (b) Part-A will carry 150 multiple choice questions (MCQs) to be attempted on the OMR sheet. Each correct answer will **carry one mark** whereas **1/4 mark** will be **deducted** for every wrong answer. Further, this Part will be divided into two Sections: Section-I: Food Biochemistry, Food Engineering and Food Microbiology; and Section-II: Food Technology. There will be 38 MCQs from Section-I and 112 MCQs from Section-II.
- (c) Part-B will contain two subjective type questions to be attempted in the space provided along with the questions in the question booklet.
- (d) Minimum 20% marks are required in the Entrance Test to be called for Counselling / Interview in Part-A and Part-B, individually.
- (e) Merit list will be prepared on the basis of:
- |   |                                |
|---|--------------------------------|
| i) Performance in the Entrance Examination          | 80% (60% MCQ + 20% subjective) |
| ii) Master's Research by Thesis & Quality of Thesis | 10%                            |
| iii) Interview                                      | 10%                            |

### 2. Syllabus

**Section-I:** Physico-chemical, functional and nutritional characteristics of carbohydrates, proteins, fats and their interactions. Biochemical and nutritional aspects of vitamins, minerals, nutraceuticals, antinutritional factors. Biological value and PER. Modern analytical techniques in food analysis. Engineering properties of food materials. Unit operations in food process engineering. Microbiology of fruits, fruit products, vegetables, bakery products, cereals, fish, egg and marine products. Spoilage of food, food pathogens and their toxins in relation to human health.

**Section-II:** Principles and methods of food processing-heat, cold, freezing, fermentations etc. Non thermal methods-irradiation, high pressure, pulse electric field, hurdle technology, minimal processing and membrane technology. Food additives and their role. Nutraceuticals, functional and health foods. Concept of quality, quality attributes of raw and processed foods, food quality management systems. Statistical quality control. National and International food laws and standards. Food adulteration and food safety. Sources, production and significance of enzymes in food processing. Preparation and manufacturing technology of cereals, bakery, extruded products, meat, fish, poultry, sea foods, milk and milk products, fruit and vegetable products, indigenous and convenience foods. Functions of packaging, packaging materials and packaging methods.

### 3. Model Questions

1. Chroma of colour depicts:
- |               |                |
|---------------|----------------|
| (A) Hue       | (B) Angle      |
| (C) Lightness | (D) Brightness |
2. The appropriate moisture of barley for malting purpose should be:
- |            |            |
|------------|------------|
| (A) 8-10%  | (B) 10-14% |
| (C) 14-17% | (D) 20-22% |
3.  $\alpha$ -amylase is an:
- |                        |                                |
|------------------------|--------------------------------|
| (A) Exoenzyme          | (B) Endoenzyme                 |
| (C) Debranching enzyme | (D) Complete hydrolytic enzyme |
4. Flavour enhancer added during food preparation is:
- |                           |                       |
|---------------------------|-----------------------|
| (A) Ethyl butyrate        | (B) Methyl Salicylate |
| (C) Mono sodium glutamate | (D) Sodium nitrate    |
5. Inert packaging refers to:
- |                                    |                             |
|------------------------------------|-----------------------------|
| (A) Packaging under carbon dioxide | (B) Packaging under vacuum. |
| (C) Packaging under nitrogen       | (D) Packaging under oxygen. |

# PET – AGRICULTURE

## HORTICULTURE (FRUIT SCIENCE)

### 1. Test Structure

- (a) The question booklet will have two parts: **Part-A** and **Part-B** to be attempted in 3 hours. Weightage for Part-A and Part-B will be 60% and 20%, respectively.
- (b) Part-A will carry 150 multiple choice questions (MCQs) to be attempted on the OMR sheet. Each correct answer will **carry one mark** whereas 1/4 **mark** will be **deducted** for every wrong answer.
- (c) Part-B will contain two subjective type questions to be attempted in the space provided along with the questions in the question booklet.
- (d) Minimum 20% marks are required in the Entrance Test to be called for Counselling / Interview in Part-A and Part-B, individually.
- (e) Merit list will be prepared on the basis of:
- |   |                                |
|---|--------------------------------|
| i) Performance in the Entrance Examination          | 80% (60% MCQ + 20% subjective) |
| ii) Master's Research by Thesis & Quality of Thesis | 10%                            |
| iii) Interview                                      | 10%                            |

### 2. Syllabus

Area and production of fruits, origin, distribution, commercial importance, export potential, species, varieties, ecophysiological requirement and cultivation practices of major fruit crops like mango, citrus, banana, grape, papaya, guava, pineapple, litchi, loquat, phalsa, jackfruit, mangosteen, sapota, cashewnut, ber, pomegranate, date palm, aonla and temperate fruits like apple, pear, peach, almond, plum, apricot and cherry.

Canopy management, weed control, modern methods of propagation including micropropagation and use of growth regulators in fruit crops, nutrient and water management, organic farming systems, use of biofertilizers, rootstocks, stock scion relationship, incompatibility, high density orcharding, major pests & diseases, physiological disorders and their control measures.

Crop improvement, Biotechnological interventions, Good agricultural practices (GAP), quality improvement, maturity indices, harvesting practices, storage and ripening techniques.

### 3. Model Questions

1. The largest producer of pear in the world is:  
(A) USA (B) Italy  
(C) China (D) France
2. Major bottleneck in banana breeding is:  
(A) Incompatibility (B) Parthenocarpy  
(C) Non-receptivity of stigma (D) All of the above
3. The highest papian yielding papaya selection is:  
(A) Co 5 (B) Co 6  
(C) Co 2 (D) Honey Dew
4. Clonal rootstocks can be easily propagated through:  
(A) Stooling (B) Grafting  
(C) Cutting (D) Air layering
5. Bronzing in litchi is due to:  
(A) Zn (B) Mn  
(C) Cu (D) Mg

# PET – AGRICULTURE

## HORTICULTURE (VEGETABLE SCIENCE)

### 1. Test Structure

- (a) The question booklet will have two parts: **Part-A** and **Part-B** to be attempted in 3 hours. Weightage for Part-A and Part-B will be 60% and 20%, respectively.
- (b) Part-A will carry 150 multiple choice questions (MCQs) to be attempted on the OMR sheet. Each correct answer will **carry one mark** whereas 1/4 **mark** will be **deducted** for every wrong answer.
- (c) Part-B will contain two subjective type questions to be attempted in the space provided along with the questions in the question booklet.
- (d) Minimum 20% marks are required in the Entrance Test to be called for Counselling / Interview in Part-A and Part-B, individually.
- (e) Merit list will be prepared on the basis of:
  - i) Performance in the Entrance Examination 80% (60% MCQ + 20% subjective)
  - ii) Master's Research by Thesis & Quality of Thesis 10%
  - iii) Interview 10%

### 2. Syllabus

Cultural and climatic requirement for cultivation of vegetables i.e. potato, tomato, chilli, brinjal, cole crops, okra, peas and beans, cucurbitaceous crops; forcing techniques of vegetable production, organic farming, post-harvest handling, physiological disorders, breeding methods of self and cross pollinated vegetable crops, micro-propagation techniques, hybrid seed production of vegetable crops, crop systems, multiple cropping, nursery raising techniques, protected cultivation, low tunnel technology, statistical tools for field experimentation, disease management in nursery and fields, determination of biochemical constituents i.e. ascorbic acid, sugars, protein, capsaicin, carotene.

### 3. Model Questions

1. Pusa summer prolific long is an important cultivar of
  - (A) Cucumber
  - (B) Bottle gourd
  - (C) Longmelon
  - (D) Snake gourd
2. Brinjal originated in:
  - (A) India
  - (B) Netherlands
  - (C) Russia
  - (D) China
3. Purple blotch is a serious disease of:
  - (A) Tomato
  - (B) Brinjal
  - (C) Onion
  - (D) None of these
4. Little leaf disease is associated with the deficiency of:
  - (A) Molybdenum
  - (B) Copper
  - (C) Nitrogen
  - (D) Zinc
5. Among the vegetable crops listed below, following is the climacteric vegetable:
  - (A) Onion
  - (B) Muskmelon
  - (C) Brinjal
  - (D) None of these

# PET – AGRICULTURE

## HORTICULTURE (FLORICULTURE & LANDSCAPING)

### 1. Test Structure

- (a) The question booklet will have two parts: **Part-A** and **Part-B** to be attempted in 3 hours. Weightage for Part-A and Part-B will be 60% and 20%, respectively.
- (b) Part-A will carry 150 multiple choice questions (MCQs) to be attempted on the OMR sheet. Each correct answer will **carry one mark** whereas **1/4 mark** will be **deducted** for every wrong answer.
- (c) Part-B will contain two subjective type questions to be attempted in the space provided along with the questions in the question booklet.
- (d) Minimum 20% marks are required in the Entrance Test to be called for Counselling / Interview in Part-A and Part-B, individually.
- (e) Merit list will be prepared on the basis of:
- |   |                                |
|---|--------------------------------|
| i) Performance in the Entrance Examination          | 80% (60% MCQ + 20% subjective) |
| ii) Master's Research by Thesis & Quality of Thesis | 10%                            |
| iii) Interview                                      | 10%                            |

### 2. Syllabus

Status of Floriculture in India and global trade, Production technology of flowers (rose, chrysanthemum, carnation, gerbera, gladiolus, tuberose, orchids, anthurium, aster, liliiums, tulip, bird of paradise, alstroemeria, dahlia, gypsophilla, limonium, stock, Jasmine, marigold, geranium, crossandra, nerium, hibiscus, barleria, celosia, gomphrena, and cut foliages. Use of Plant growth regulators(PGRs). Breeding of ornamental crops, mutation breeding, heterosis breeding, polyploidy, In-vitro breeding. Role of genetic engineering in improvement of ornamentals, Patents and plant variety protection in India. Protected cultivation of flowers. Flower seed production. Post-harvest handling of flowers. Techniques in dry flower. Flower forcing and year round flowering through physiological interventions, chemical regulation and environmental manipulations. Physiological disorders and control. Plant protection measures in ornamentals, IPM, IDM. Classification of plant material and their use in landscaping, waterscaping, xeriscaping. Nursery production of ornamentals, propagation structures, media for nursery, special nursery practices. Landscape principles and their application. Turfing and Turf Management. Terrace and roof gardening. Master plan of cities in relation to open spaces. Value addition in Flowers, Selection of species and varieties for pigment extraction. Types of pigments- carotenoids, anthocynin, chlorophyll, betalains, Significance of natural pigments.

### 3. Model Questions

1. Indian Floribunda rose cultivar patented in USA?  
(A) Fugitive (B) Mohini  
(C) Sindhoor (D) Banjaran
2. Inheritance of pigments is controlled by which gene action:  
(A) Additive (B) Epistasis  
(C) Dominance (D) None of these
3. Change from mutant allele to wild type is known as:  
(A) Somatic mutation (B) Reverse mutation  
(C) Nuclear mutation (D) None of these
4. Which of the following is not a warm orchid?  
(A) *Phalaenopsis* (B) *Vanda*  
(C) *Dendrobium* (D) *Cymbidium*
5. Pyrethrum is extracted from which *Chrysanthemum* species?  
(A) *C. indicum* (B) *C. morifolium*  
(C) *C. cinerariifolium* (D) *C. sinense*

# PET – AGRICULTURE

## PLANT BREEDING & GENETICS

### 1. Test Structure

- (a) The question booklet will have two parts: **Part-A** and **Part-B** to be attempted in 3 hours. Weightage for Part-A and Part-B will be 60% and 20%, respectively.
- (b) Part-A will carry 150 multiple choice questions (MCQs) to be attempted on the OMR sheet. Each correct answer will **carry one mark** whereas 1/4 **mark** will be **deducted** for every wrong answer.
- (c) Part-B will contain two subjective type questions to be attempted in the space provided along with the questions in the question booklet.
- (d) Minimum 20% marks are required in the Entrance Test to be called for Counselling / Interview in Part-A and Part-B, individually.
- (e) Merit list will be prepared on the basis of:
  - i) Performance in the Entrance Examination 80% (60% MCQ + 20% subjective)
  - ii) Master's Research by Thesis & Quality of Thesis 10%
  - iii) Interview 10%

### 2. Syllabus

History, objectives and achievements of Plant Breeding. Biodiversity. Genetic basis and breeding methods in self-, cross-pollinated and asexually reproducing crops. Heterosis and inbreeding. Quantitative genetics. Evolutionary significance of chromosomal aberrations. Polyploidy and its role in crop breeding. Aneuploidy and its role in basic and applied aspects of crop breeding. Apomixis. Genome mapping. Wide hybridization. Chromosome manipulations. Alien addition and substitution lines. Production and use of haploids and doubled haploids in genetics and plant breeding. Hybrid breeding. Self-incompatibility and male sterility. Genetically engineered male-sterility. Heterosis breeding in wheat, rice, cotton, maize, pearl millet, sorghum and oilseed crops. Hybrid breeding at National and International level. Concept of plant ideotype. Mutation breeding. Breeding for biotic abiotic and biotic stresses. Release and notification of varieties. Maintenance breeding. Plant Breeders' Rights and regulations for plant variety protection and farmers' rights. Genetic material. Protein biosynthesis. Gene regulation. Gene interactions. Linkage. Gene cloning. Genomics and proteomics. Alien gene transfer approaches. Transgenics. Gene silencing. Genetic diversity analysis. Association analysis. Path analysis and parent-progeny regression analysis. Discriminant function and principal component analyses. Selection indices. Heritability and genetic advance. Generation mean analysis. Mating designs. Genotype x environment interaction. Stability parameters. AMMI analysis – principles and interpretation. QTL mapping. Marker assisted selection (MAS).

### 3. Model Questions

1. Line X Tester analysis is a good approach for screening germplasm on the basis of:
  - (A) GCA and SCA variances
  - (B) GCA and SCA effects
  - (C) GCA and SCA variances and effects
  - (D) *per se* performance of hybrids
2. In case of ear-to-row method, each selection cycle requires:
  - (A) One year
  - (B) Two years
  - (C) Three years
  - (D) Four years
3. When a single cross hybrid is crossed with an open-pollinated variety, it is termed as:
  - (A) Top cross
  - (B) Test cross
  - (C) Double top cross
  - (D) Three way cross
4. Sweet potato is an auto polyploidy and has ploidy level of:
  - (A) 3 x
  - (B) 4 x
  - (C) 5 x
  - (D) 6 x
5. Among the given restriction enzymes, which is a type III restriction endonuclease?
  - (A) Hinf III
  - (B) EcoP15
  - (C) EcoPI
  - (D) All of the above



# PET – AGRICULTURE

## PLANT PATHOLOGY

### 1. Test Structure

- (a) The question booklet will have two parts: **Part-A** and **Part-B** to be attempted in 3 hours. Weightage for Part-A and Part-B will be 60% and 20%, respectively.
- (b) Part-A will carry 150 multiple choice questions (MCQs) to be attempted on the OMR sheet. Each correct answer will **carry one mark** whereas 1/4 **mark** will be **deducted** for every wrong answer.
- (c) Part-B will contain two subjective type questions to be attempted in the space provided along with the questions in the question booklet.
- (d) Minimum 20% marks are required in the Entrance Test to be called for Counselling / Interview in Part-A and Part-B, individually.
- (e) Merit list will be prepared on the basis of:
- |   |                                |
|---|--------------------------------|
| i) Performance in the Entrance Examination          | 80% (60% MCQ + 20% subjective) |
| ii) Master's Research by Thesis & Quality of Thesis | 10%                            |
| iii) Interview                                      | 10%                            |

### 2. Syllabus

Milestones in phytopathology with particular reference to India. Major epidemics and their social impacts. Historical developments of chemicals, legislative, cultural and biological protection measures including classification of plant diseases. Physiologic specialization, Koch's postulates. Growth, reproduction, survival and dispersal of plant pathogens. Factors influencing infection, colonization and development of symptoms. Preparation and sterilization of common media. Methods of isolation of pathogens and their identification. Preservation of microorganisms in pure culture. Methods of inoculation. Measurement of plant disease. Laboratory equipment and their use. Variability and classification of fungi and their identification up to genus level. Identification and classification of bacteria. morphology, ultrastructure and chemical composition of prokaryotic cell in relation to function. Growth curve, nutrition and auxotrophic mutants. Resting cells in prokaryotic, elementary bacterial genetics and variability. Prokaryotic inhibitors and their mode of action. Economic uses of prokaryotes. Morphology, biochemical characteristics, reproduction and life cycle of phytoplasma and other fastidious prokaryotes. Nature, composition and architecture of viruses and viroids. Properties of viruses. Variability in viruses. Satellite viruses and satellite RNA. Conventional and biotechnological techniques used in detection and diagnosis of viruses and viroids. Behaviour of viruses in plants including infection, replication and movement. Histopathological changes induced by viruses in plants, inclusion bodies. Transmission of viruses. Nomenclature and classification of viruses. Diseases of cereals, millets, pulses, oilseeds, fibre crops, vegetables, fruits, spices, plantation and ornamental crops caused by fungi, bacteria, nematodes, viruses, viroids, phytoplasmas and other fastidious prokaryotes with special reference to symptomatology, etiology, disease cycle, perpetuation, epidemiology and management. Post harvest diseases in transit and storage; aflatoxins and their integrated management.

### 3. Model Questions

1. The powdery mildew fungi belongs to:
- |                    |                    |
|--------------------|--------------------|
| (A) Oomycetes      | (B) Ascomycetes    |
| (C) Deuteromycetes | (D) Basidiomycetes |
2. *Trichoderma viride* produces antagonistic metabolites such as:
- |                  |              |
|------------------|--------------|
| (A) Organic acid | (B) Methanol |
| (C) Viridin      | (D) Chrysin  |

# PET – AGRICULTURE

## SOIL SCIENCE

### 1. Test Structure

- (a) The question booklet will have two parts: **Part-A** and **Part-B** to be attempted in 3 hours. Weightage for Part-A and Part-B will be 60% and 20%, respectively.
- (b) Part-A will carry 150 multiple choice questions (MCQs) to be attempted on the OMR sheet. Each correct answer will **carry one mark** whereas 1/4 **mark** will be **deducted** for every wrong answer.
- (c) Part-B will contain two subjective type questions to be attempted in the space provided along with the questions in the question booklet.
- (d) Minimum 20% marks are required in the Entrance Test to be called for Counselling / Interview in Part-A and Part-B, individually.
- (e) Merit list will be prepared on the basis of:
- |   |                                |
|---|--------------------------------|
| i) Performance in the Entrance Examination          | 80% (60% MCQ + 20% subjective) |
| ii) Master's Research by Thesis & Quality of Thesis | 10%                            |
| iii) Interview                                      | 10%                            |

### 2. Syllabus

Physical Behaviour: Soil consistence. Soil compaction and consolidation. Soil crusting. Puddling. Energy state of soil water, moisture characteristics. Water flow in saturated and unsaturated soils. Soil water movement, infiltration, redistribution, drainage and evaporation. Soil aeration. Modes of energy transfer in soils. Soil Chemistry: Chemistry of acid, salt affected and submerged soils and management aspects. Equilibrium thermodynamics, chemical equilibria, electrochemistry and chemical kinetics. Inorganic and organic colloids. Cation exchange. Potassium, phosphate and ammonium fixation in soils and management aspects. Soil Fertility and Fertilizer Use: Nutrient sources-fertilizers and manures. Soil N-sources and N transformations and biological nitrogen fixation. Nitrogenous fertilizers – their fate in soils and enhancing N use efficiency. Soil Phosphorus and Potassium forms. Management of P and K fertilizers. Sulphur, Ca and Mg-source, forms, fertilizers and their behavior in soils and management. Micronutrients-critical limits in soils and plants, factors affecting their availability. Integrated nutrient management. Soil Mineralogy, Genesis, Classification and Survey: Genesis and transformation of crystalline clay minerals. Clay minerals in Indian soils. Soil formation-factors, models, processes. Weathering of rocks and mineral transformations. Soil profile. Soil survey-characterization, bench mark soils and correlation. Soil classification systems. Soil survey-types, techniques and interpretations. Landform, evaluation and land use type. Soil biology and biochemistry: Soil biota, microbial ecology and types of organisms. Soil enzymes and soil characteristics influencing growth and activity of micro-flora. Microbial transformations of N, P, S, Fe and Mn in soil. Humus formation- biochemical composition and biodegradation. Biodegradation of pesticides, organic wastes and their use for production of biogas and manures. Biotic factors and bio-fertilizers in soils.

### 3. Model Questions

1. Solubility of  $\text{CaCO}_3$  in soils increases with:
- |                      |   |
|----------------------|---|
| (A) Decrease in pH   | (B) Increase in partial pressure of $\text{CO}_2$ |
| (C) Both (A) and (B) | (D) None of these                                 |
2. Dominant micro-flora of soil is:
- |              |                   |
|--------------|-------------------|
| (A) Bacteria | (B) Actinomycetes |
| (C) Fungi    | (D) Algae         |
3. Glacial parent material is:
- |                |                   |
|----------------|-------------------|
| (A) Stratified | (B) Well sorted   |
| (C) Ill-sorted | (D) None of these |
4. Size range of colloidal particle is:
- |                 |                   |
|-----------------|-------------------|
| (A) $<0.002$ mm | (B) $<0.001$ mm   |
| (C) $>0.002$ mm | (D) None of these |
5. Wetting of water unstable aggregates causes:
- |                            |                |
|----------------------------|----------------|
| (A) Slaking                | (B) Compaction |
| (C) Slaking and compaction | (D) No effect  |

# PET – AGROMET

## 1. Test Structure

- (a) The question booklet will have two parts: **Part-A** and **Part-B** to be attempted in 3 hours. Weightage for Part-A and Part-B will be 60% and 20%, respectively.
- (b) Part-A will carry 150 multiple choice questions (MCQs) to be attempted on the OMR sheet. Each correct answer will **carry one mark** whereas 1/4 **mark** will be **deducted** for every wrong answer.
- (c) Part-B will contain two subjective type questions to be attempted in the space provided along with the questions in the question booklet.
- (d) Minimum 20% marks are required in the Entrance Test to be called for Counselling / Interview in Part-A and Part-B, individually.
- (e) Merit list will be prepared on the basis of:
- |   |                                |
|---|--------------------------------|
| i) Performance in the Entrance Examination          | 80% (60% MCQ + 20% subjective) |
| ii) Master's Research by Thesis & Quality of Thesis | 10%                            |
| iii) Interview                                      | 10%                            |

## 2. Syllabus

Solar radiation & basic Laws of radiation, radiation interactions with plant environment. Radiation distribution in plant communities. Energy balance in atmosphere and crop canopy. General circulation of atmosphere. Stability and instability. Lapse rates-ascent of dry and moist air, condensation. Clouds. Hydrological cycle. Air masses and fronts. Zonal distribution of radiation, rainfall, temperature, and wind. SE Asian monsoon. Weather forecasting importance, types and techniques of weather forecasting. Climatic statistics. Measures of central tendency and dispersion, correlation, regression, moving average probability and their distribution function. Analysis of weather systems. Importance of meteorological parameters in agriculture. Basic principles of water balance, soil-water balance models. Crop weather calendars. Agromet advisories. Natural hazards. Drought- concepts and types. Crop-weather-pest interactions. Crop modeling. Climate classifications- agro-climatic zones of Punjab & India. Variations in microclimate under different canopies. Richardson number and Reynolds analogy. Weather and climate modification. Modification of microclimate. Leaf temperature and its biological effects. Agromet. Instruments -Theory and working principles of different instruments. Effects of ambient weather conditions on growth, development and yield of crops. Energy balance over crops. Remote Sensing-fundamentals of measurement techniques. Theories and methods of ET estimation. Concepts of potential, reference and actual evapotranspiration - modified techniques. Climatic change and agriculture.

## 3. Model Questions

1. The tropical / sub-tropical hot deserts are found between:
- |                        |                        |
|------------------------|------------------------|
| (A) 15° to 35° N and S | (B) 35° to 45° N and S |
| (C) 50° to 60° N       | (D) 5° to 15° N and S  |
2. La Nina condition indicates:
- |  |  |
|--|--|
| (A) Drop in the temperature of Indian ocean      | (B) Drop in temperature in Atlantic ocean    |
| (C) Drop in the temperature in the Pacific ocean | (D) Drop in temperature in the Mediterranean |
3. In a tropical cyclone the pattern of isobars is:
- |                |                   |
|----------------|-------------------|
| (A) Elliptical | (B) Circular      |
| (C) Oval       | (D) Semi-circular |

# PET – BIOTECH

## 1. Test Structure

- (a) The question booklet will have two parts: **Part-A** and **Part-B** to be attempted in 3 hours. Weightage for Part-A and Part-B will be 60% and 20%, respectively.
- (b) Part-A will carry 150 multiple choice questions (MCQs) to be attempted on the OMR sheet. Each correct answer will **carry one mark** whereas  $\frac{1}{4}$  **mark** will be **deducted** for every wrong answer.
- (c) Part-B will contain two subjective type questions to be attempted in the space provided along with the questions in the question booklet.
- (d) Minimum 20% marks are required in the Entrance Test to be called for Counselling / Interview in Part-A and Part-B, individually.
- (e) Merit list will be prepared on the basis of:
  - i) Performance in the Entrance Examination 80% (60% MCQ + 20% subjective)
  - ii) Master's Research by Thesis & Quality of Thesis 10%
  - iii) Interview 10%

## 2. Syllabus

Plant Biotechnology and its scope. Various aspects of plant tissue culture micropropagation, anther and microspore culture, somaclonal variation, embryo rescue, *in vitro* mutagenesis, *in vitro* fertilization and *in vitro* germplasm conservation. Production of secondary metabolites, Synthetic seeds, Protoplast culture and regeneration, Somatic hybridization. Recombinant DNA technology. Genetic transformation, Vector and vector less methods of plant transformation, Genetic and molecular analyses of transgenics, Target traits and transgenic crops. Biosafety issues of transgenics, Recombinant DNA technology, Construction and uses of genomic and cDNA libraries, library screening, Hybridization techniques, Identification, isolation and characterization of genes, Applications of gene cloning, Chromatin and chromosome structure, Structure of centromere and telomere, Genome organization in eukaryotes, Molecular markers and their application. RFLP, PCR based markers and SNP markers. Construction of molecular maps, Marker Assisted Selection, Genome wide association mapping, Physical maps, QTL mapping, Fine mapping, Comparative genomics. Advances in DNA sequencing, Genotyping by sequencing, Proteomics, Biosafety, bioethics and intellectual property rights in biotechnology. Allele mining by TILLING and Eco-TILLING and deep sequencing, Functional genomics: DNA chips and their use in transcriptome analysis, Mutants and RNAi in functional genomics, Applications of genomics in agriculture. Introductory Bioinformatics, sequence assembly and gene annotation.

## 3. Model Questions

1. Southern blotting technique is used to separate:
  - (A) RNA fragments
  - (B) DNA fragments
  - (C) Proteins
  - (D) Carbohydrates
2. Organelle gene transfer can be obtained through:
  - (A) *Agrobacterium* mediated transformation of nucleus
  - (B) Particle gun mediated transformation of nucleus
  - (C) Particle gun mediated transformation of organelle
  - (D) Electroporation of nucleus
3. Regeneration in test tube can be obtained by addition of:
  - (A) Auxin in the media
  - (B) Cytokinin in the media
  - (C) Gibberellins
  - (D) None of these
4. Molecular markers have found utility in:
  - (A) Genetic transformation
  - (B) Genome mapping
  - (C) Gene sequencing
  - (D) Gene annotation
5. Restriction endonuclease are used in molecular biology for:
  - (A) Gene ligation
  - (B) Gene amplification
  - (C) Gene cutting
  - (D) End filling

# PET – AGRICULTURAL ENGINEERING

## FARM MACHINERY & POWER ENGINEERING

### 1. Test Structure

- (a) The question booklet will have two parts: **Part-A** and **Part-B** to be attempted in 3 hours. Weightage for Part-A and Part-B will be 60% and 20%, respectively.
- (b) Part-A will carry 150 multiple choice questions (MCQs) to be attempted on the OMR sheet. Each correct answer will **carry one mark** whereas 1/4 **mark** will be **deducted** for every wrong answer.
- (c) Part-B will contain two subjective type questions to be attempted in the space provided along with the questions in the question booklet.
- (d) Minimum 20% marks are required in the Entrance Test to be called for Counselling / Interview in Part-A and Part-B, individually.
- (e) Merit list will be prepared on the basis of:
  - i) Performance in the Entrance Examination 80% (60% MCQ + 20% subjective)
  - ii) Master's Research by Thesis & Quality of Thesis 10%
  - iii) Interview 10%

### 2. Syllabus

Research and development procedure in farm equipment and agricultural tractors. Mechanical and hydraulic, selection, design analysis. Analysis of linkages. Reliability criteria. Dynamic properties of soil related to tillage and traction. Design considerations for tillage tools. Soil vehicle models. Testing types, Test Procedures and various Test codes. Concept of dimensional analysis. Algorithm design, program composition, quality control. Approximation, round off errors, truncation errors. Simulation of simple discrete systems. Solving differential equation on computers- modeling engineering systems with ordinary differential equations- solution techniques using computers. Strain -stress, strain relationship. Strain gauges. Measuring devices for displacement, velocity, force, torque and power. Active and passive transducers. Cost analysis of farm machinery use and operations. System engineering function. System approach in farm machinery management. Equipment replacement and inventory control. Work space design. Modeling of optimum mechanization systems. Modern trends in tractor design and development, special design features of tractor in relation to Indian agriculture. Parameters affecting design of tractor engine and their selection. Design of engine components and tractor systems. Mechanics of tractor. Human factors in system development. Anthropometry. Man-Machine system concept. Safety standards at workplace. Physical characteristics- of different food grains, fruits and vegetables. Rheology, terms, physical states of materials, visco-elasticity, creep stress relaxation, Friction in agricultural materials, rolling resistance, angle of internal friction, angle of repose, aero dynamics of agricultural products, drag coefficients, terminal velocity, Thermal properties, Electrical properties.

### 3. Model Questions

1. A stone falls from top of a building 200 m high and at the same time another is projected vertically upwards with a velocity of 50 m/s, then the two will meet:  
(A) After 1 s (B) After 2 s  
(C) After 4 s (D) After 8 s
2. Wear resistant soil working tools are made from the alloy of:  
(A) Copper and zinc (B) Carbon and iron  
(C) Iron and nickel (D) Nickel and molybdenum
3. Future price of farm equipment in the nth year at constant rate of inflation can be calculated by:  
(A)  $F = P (1+i)^n$  (B)  $F = P I^n$   
(C)  $F = P (1+i)^{-n}$  (D)  $F = P (1 + (1+i)^{-1/n})$
4. Hydraulic agitation of oil emulsions for sprayers is used for the following case:  
(A) High pressure sprayers (B) Low capacity spray pumps  
(C) High capacity spray pumps (D) Usually used as this system is economical
5. A cultivator (11x30 cm) is operated at a depth of 10 cm. The furrow cross-section is a triangle having 90° tip angle. If the unit draft of the soil is 20 kN/m<sup>2</sup>, the draft will be:  
(A) 110 N (B) 1.1 kN  
(C) 220 N (D) 4.4 kN

# PET – AGRICULTURAL ENGINEERING

## PROCESSING & FOOD ENGINEERING

### 1. Test Structure

- (a) The question booklet will have two parts: **Part-A** and **Part-B** to be attempted in 3 hours. Weightage for Part-A and Part-B will be 60% and 20%, respectively.
- (b) Part-A will carry 150 multiple choice questions (MCQs) to be attempted on the OMR sheet. Each correct answer will **carry one mark** whereas 1/4 **mark** will be **deducted** for every wrong answer.
- (c) Part-B will contain two subjective type questions to be attempted in the space provided along with the questions in the question booklet.
- (d) Minimum 20% marks are required in the Entrance Test to be called for Counselling / Interview in Part-A and Part-B, individually.
- (e) Merit list will be prepared on the basis of:
  - i) Performance in the Entrance Examination 80% (60% MCQ + 20% subjective)
  - ii) Master's Research by Thesis & Quality of Thesis 10%
  - iii) Interview 10%

### 2. Syllabus

Transport Phenomena in Food Processing, applications in various unit operations of food processing. Unsteady state heat transfer, mass transfer applications in food processing. Engineering Properties of Biological Material, Physical characteristics of different food grains, fruits and vegetables; Shape and size, description of shape and size, volume and density, porosity, surface area.; Application of engineering properties in design and operation of agricultural equipment and structures. Processing of Cereals, Pulses and Oilseeds, Production and utilization of cereals, pulses and oilseeds, grain quality standards, Pre-milling treatments, conventional, modern and integrated milling operations;; BIS standards for various processed products. Advanced Food Process Engineering. Microwave, irradiation, ohmic heating, pulsed electric field preservation, hydrostatic pressure technique, principles, equipments and applications. Extrusion, Cold storage, controlled atmosphere packaging of fruits and vegetables. Osmotic dehydration, foam mat drying, freeze drying, general principles of quality standards and control, FPO, quality attributes. Food Packaging. Storage Engineering and Handling of Agricultural Products. Storage of grains, biochemical changes during storage, storage capacity models, Grain markets, storage of dehydrated products. Mass and energy balance. Food plant hygiene-waste disposal methods.

### 3. Model Questions

1. The moisture content on dry basis in comparison with wet basis can be:  
(A) 50% (B) More than 100%  
(C) Less than or equal to 100% (D) None of these
2. Food properties like chewiness, gumminess, springiness and adhesiveness are measured by:  
(A) Spectronic-20 (B) Instron  
(C) Instron and Texture analyzer (D) Texture analyzer
3. Process of reducing fat droplet size in milk to prevent cream separation is known as:  
(A) Pasteurization (B) Centrifugation  
(C) Crystallization (D) Homogenization
4. The process of removal of field heat from fruits and vegetables is known as:  
(A) Cold storage (B) CA storage  
(C) Hypobaric storage (D) Pre-cooling
5. The most efficient oil extraction process is:  
(A) Hydraulic press (B) Mechanical expression  
(C) Solvent extraction (D) None of these

# PET – AGRICULTURAL ENGINEERING

## SOIL & WATER ENGINEERING

### 1. Test Structure

- (a) The question booklet will have two parts: **Part-A** and **Part-B** to be attempted in 3 hours. Weightage for Part-A and Part-B will be 60% and 20%, respectively.
- (b) Part-A will carry 150 multiple choice questions (MCQs) to be attempted on the OMR sheet. Each correct answer will **carry one mark** whereas 1/4 **mark** will be **deducted** for every wrong answer.
- (c) Part-B will contain two subjective type questions to be attempted in the space provided along with the questions in the question booklet.
- (d) Minimum 20% marks are required in the Entrance Test to be called for Counselling / Interview in Part-A and Part-B, individually.
- (e) Merit list will be prepared on the basis of:
  - i) Performance in the Entrance Examination 80% (60% MCQ + 20% subjective)
  - ii) Master's Research by Thesis & Quality of Thesis 10%
  - iii) Interview 10%

### 2. Syllabus

**Section I:** Watershed characteristics, hydrologic parameters, frequency analysis. Hydrograph analysis, theory of unit hydrograph, synthetic hydrograph, S-hydrograph and instantaneous unit hydrograph. Flood routing methods. Reservoir sedimentation. Hydrologic modeling.

**Section II:** Irrigation water requirement, conveyance, distribution, application, water budgeting, irrigation efficiencies, water quality and salinity management. Hydraulics, design, operation and evaluation of border, check basin, furrow, sprinkler and trickle irrigation systems.

**Section III:** Design of surface and subsurface drainage. multiple well point system. Steady and unsteady state drainage equations for layered and non-layered soils. Principle and applications of Hooghoudt, Kirkham, Earnst, Glover Dumm, Kraijenhoff-van-de-leur equations. Salt balance, leaching requirement and management practices.

**Section IV:** Groundwater occurrence and movement. water balance. Aquifer and fluid properties. Hydraulics of fully and partially penetrating wells in confined, leaky and unconfined aquifers. differential equations of saturated and unsaturated flow. Dupuit and Boussinesq approximations and linearization techniques. Flow analysis in interfering wells. Pumping tests. Groundwater recharge. Groundwater modeling. stream functions, potential functions and flow net theory. Hydro-dynamic dispersion in soil-aquifer system.

### 3. Model Questions

1. The equation for unsteady radial flow in leaky aquifer was developed by:  
(A) Thesis (B) Theim  
(C) Dupuit (D) Hantush and Jacob
2. Aquifer diffusivity is:  
(A)  $S/T$  (B)  $T/S$   
(C)  $(T/C)^{1/2}$  (D)  $b/k$
3. In small watersheds, the following process dominate:  
(A) Overland flow (B) Channel flow  
(C) River flow (D) Both (A) & (B)
4. Spacing between the drains under unsteady condition is determined by the equation:  
(A) Hooghoudt (B) Kirkham  
(C) Glover-Dumm (D) Earnst
5. The most important parameter for designing sub-surface drainage system is:  
(A) Drain depth (B) Drain spacing  
(C) Hydraulic conductivity (D) Drain layout

# PET – EST

## ENERGY SCIENCE & TECHNOLOGY

### 1. Test Structure

- (a) The question booklet will have two parts: **Part-A** and **Part-B** to be attempted in 3 hours. Weightage for Part-A and Part-B will be 60% and 20%, respectively.
- (b) Part-A will carry 150 multiple choice questions (MCQs) to be attempted on the OMR sheet. Each correct answer will **carry one mark** whereas 1/4 **mark** will be **deducted** for every wrong answer. Further, this Part will be divided into two sections: Section-I and Section-II. The weightage for Section-I and Section-II will be 40% and 60%, respectively. Section-I will have 60 MCQs whereas Section-II will have 90 MCQs. Candidate will have an option to answer questions from any one of the three specializations in Agricultural Engineering viz. Farm Machinery & Power Engineering, Processing & Food Engineering, and Soil & Water Engineering.
- (c) Part-B will contain two subjective type questions to be attempted in the space provided along with the questions in the question booklet.
- (d) Minimum 20% marks are required in the Entrance Test to be called for Counselling / Interview in Part-A and Part-B, individually.
- (e) Merit list will be prepared on the basis of:
- |   |                                |
|---|--------------------------------|
| i) Performance in the Entrance Examination          | 80% (60% MCQ + 20% subjective) |
| ii) Master's Research by Thesis & Quality of Thesis | 10%                            |
| iii) Interview                                      | 10%                            |

### 2. Syllabus

**Section I:** Energy sources and their classification, Energy conservation; Biomass: resources, fuel related properties of biomass, collection, handling and pre-conditioning processes such as cutting, grinding, bailing, briquetting, densification etc, equipments and techniques for biomass harvest, collection, handling and pre-conditioning processes. Principle of combustion, pyrolysis and gasification; furnaces for biomass combustion, gasifiers, operating parameters of gasifiers, design of gasifiers, utilization of producer gas for thermal application and electricity generation. Biogas plants, working, performance and maintenance of plants, design of different types of biogas plants, application of biogas for thermal, lighting and engine operation. Solar radiation, design and performance of flat plate and concentrating solar collectors, solar devices, principle and applications of solar photovoltaic, solar pond, etc.

**Section II:** A candidate can choose to answer questions from anyone of the three specializations in Agricultural Engineering. For each specialization, the syllabus is same as that for entrance tests for Ph.D. programme of that specialization.

### 3. Model Questions

1. A bomb calorimeter is used to determine:  
(A) Lower heating value  
(B) Higher heating value  
(C) Temperature  
(D) None of these
2. Solar energy is distributed over entire surface of earth facing the sun and it seldom exceeds:  
(A) 1.0 MW/m<sup>2</sup>  
(B) 1.0 kW/m<sup>2</sup>  
(C) 1.0 W/m<sup>2</sup>  
(D) 1.0 J/m<sup>2</sup>
3. The vertical angle between the projection of the sun's ray on the horizontal plane and the direction of sun's rays passing through the point is called:  
(A) Solar angle  
(B) Altitude angle  
(C) Zenith angle  
(D) Latitude
4. Density of a single piece of biomass is:  
(A) Bulk density  
(B) True density  
(C) Both (A) and (B)  
(D) None of these
5. Calorific value of Producer gas is:  
(A) 4.0-6.0 MJ/Nm<sup>3</sup>  
(B) 4.0-6.0 kJ/ Nm<sup>3</sup>  
(C) 4.0-6.0 J/ Nm<sup>3</sup>  
(D) 4.0-6.0 calories/ Nm<sup>3</sup>



# PET – BASIC SCIENCES

## BIOCHEMISTRY

### 1. Test Structure

- The question booklet will have two parts: **Part-A** and **Part-B** to be attempted in 3 hours. Weightage for Part-A and Part-B will be 60% and 20%, respectively.
- Part-A will carry 150 multiple choice questions (MCQs) to be attempted on the OMR sheet. Each correct answer will **carry one mark** whereas 1/4 **mark** will be **deducted** for every wrong answer.
- Part-B will contain two subjective type questions to be attempted in the space provided along with the questions in the question booklet.
- Minimum 20% marks are required in the Entrance Test to be called for Counselling / Interview in Part-A and Part-B, individually.
- Merit list will be prepared on the basis of:
  - Performance in the Entrance Examination 80% (60% MCQ + 20% subjective)
  - Master's Research by Thesis & Quality of Thesis 10%
  - Interview 10%

### 2. Syllabus

General Biochemistry: Principles governing life; structure and biological function of water; acid base concept and buffers; pH; pK, hydrogen bonding; Classification, structure and function of carbohydrates, lipids and nucleic acids. Primary, secondary and tertiary structures of proteins. Protein folding and stability. Protein sequencing. Hormones and their mode of action. Vitamins, Bioenergetics, oxidative phosphorylation.

Intermediary Metabolism: Methods of studying metabolism, transport mechanism, biological oxidation, signal transduction. Catabolic and anabolic pathways of carbohydrates, lipids, regulation and their metabolic disorders. Energy transduction and oxidative phosphorylation, general reactions of amino acid metabolism, degradative and biosynthetic pathways of amino acids and their metabolic disorders. Nucleic acid biosynthesis, degradation and regulation. Sulphur metabolism. Regulation of metabolic pathways. Integration of metabolism.

Enzymology: Enzyme nomenclature and classification. Isolation and purification of enzymes, Ribozymes, isozymes, abzymes, enzyme structure, enzyme specificity, active site, active site mapping, mechanism of enzyme catalysis. Cofactors, coenzymes their structure and role, enzyme kinetics, enzyme inhibition and activation, multienzyme complexes, allosteric enzymes and their kinetics, regulation of enzyme activity. Applications of enzymes in chemical and food industry, enzyme immobilization, biosensors and clinical applications of enzymes.

Molecular Biochemistry: Historical development of molecular biology, Genome organization in prokaryotes and eukaryotes, super coiling. DNA replication, DNA repair, recombination, reverse transcriptase, repetitive and non-repetitive DNA, satellite DNA. Transcription in prokaryotes and eukaryotes, RNA editing, RNA processing. Genetic code, ribosome structure and function, transcription and translation. Post translational modifications; protein targeting, Regulation of gene expression, molecular mechanism of mutations. DNA sequencing, recombinant DNA technology, different types of vectors, genomic and cDNA library, PCR, site directed mutagenesis.

Techniques & Plant Biochemistry: Chromatographic and electrophoretic methods of separation: Principles and applications of paper, thin layer and HPTLC, gas-liquid chromatography, HPLC and FPLC; paper and gel electrophoresis, different variants of polyacrylamide gel electrophoresis. Spectrophotometry: Principles and applications of UV-Visible, fluorescence, IR and FTIR, Viscosity and sedimentation-their principles, variants and applications. Radio tracer techniques in biology: radioactivity counting methods with principles of different types of counters, autoradiography. Plant cell organelles and their separation, structure and functions. Photosynthetic pigments in relation to their functions, photosynthesis, C<sub>3</sub>, C<sub>4</sub> and CAM pathways, photorespiration. Synthesis and transport of sucrose, phloem loading and unloading, sucrose-starch interconversion, biosynthesis of structural carbohydrates, storage proteins and lipids. Biochemistry of nitrogen fixation and nitrate assimilation, Biochemistry of seed germination and development, biochemistry of fruit ripening, phytohormones and their mode of action, Biochemistry and significance of secondary metabolites.

### 3. Model questions:

- The primary structure of proteins have
  - Peptide bonds
  - Hydrogen bonds
  - Ionic bonds
  - Disulphide bonds
- Different codons that specify the same amino acid are called
  - Degenerate
  - Universal
  - Synonymous
  - None of these
- Visible light has wavelength range of
  - 200-400 nm
  - 400-700 nm
  - 700-900 nm
  - Lesser than 200 nm
- Reversible inhibition of enzyme can be reversed by
  - Filtering the inhibitor from the assay system
  - dialysis
  - centrifugation
  - None of these
- Which one of the following is non-saponifiable lipid?
  - Cholesterol
  - Diglyceride
  - Triglyceride
  - Phosphatidic acid



# PET – BASIC SCIENCES

## BOTANY

### 1. Test Structure

- The question booklet will have two parts: **Part-A** and **Part-B** to be attempted in 3 hours. Weightage for Part-A and Part-B will be 60% and 20%, respectively.
- Part-A will carry 150 multiple choice questions (MCQs) to be attempted on the OMR sheet. Each correct answer will **carry one mark** whereas 1/4 **mark** will be **deducted** for every wrong answer.
- Part-B will contain two subjective type questions to be attempted in the space provided along with the questions in the question booklet.
- Minimum 20% marks are required in the Entrance Test to be called for Counselling / Interview in Part-A and Part-B, individually.
- Merit list will be prepared on the basis of:
  - Performance in the Entrance Examination 80% (60% MCQ + 20% subjective)
  - Master's Research by Thesis & Quality of Thesis 10%
  - Interview 10%

### 2. Syllabus

Nomenclature, classical & quantitative methods of taxonomy of plants, structural, biochemical and molecular systematics. Levels of organization of tissues, organs & systems. Comparative anatomy and adaptive modifications, tissue ontogeny in relation to functional specialization, transfer cells. Embryogenesis, polyembryony, parthenogenesis and parthenocarp; pollen pistil interactions; fertilization, establishment of symmetry in plants; seed formation and germination. Organization of shoot and root apical meristem; shoot and root development; leaf development and phyllotaxy; transition to flowering, floral meristems and floral development.

Light harvesting complexes; mechanisms of electron transport; photoprotective mechanisms; CO<sub>2</sub> fixation-C<sub>3</sub>,C<sub>4</sub> and CAM pathways, importance of photosynthesis in bioproductivity. Citric acid cycle; plant mitochondrial electron transport and ATP synthesis; alternate oxidase; photorespiratory pathway. Nitrate and ammonium assimilation; amino acid biosynthesis. Biosynthesis, storage, breakdown and transport; physiological effects and mechanisms of action; signal transduction in plant cells.

Structure, function and mechanism of action of phytochromes, cryptochromes and phototropins; stomatal movement; photoperiodism and biological clocks; vernalization. Uptake, transport and translocation of water, ions, solutes and macromolecules from soil, through cells, across membranes, through xylem and phloem; transpiration; mechanisms of loading and unloading of photoassimilates. Nutrient deficiency and toxicity, N, P and S metabolism. Response of plants to biotic and abiotic (water, temperature, salt, anoxic and radiation) stress, adaptation mechanisms of plants.

Ecosystem structure; ecosystem function; energy flow and mineral cycling (C, N, P); primary production and decomposition; structure and function of some Indian ecosystems: terrestrial and aquatic. Agro biodiversity, its missions and concerns; Environmental pollution; global environmental change; biodiversity status; major drivers of biodiversity change; biodiversity management approaches Environmental monitoring, impact assessment.

Principles and methods of genetic engineering of plants with particular reference to photosynthesis, nitrogen fixation and seed proteins; rapid plant propagation by tissue culture; cell lines; cell clones; *in vitro* approaches to the genetic manipulation of plants; somatic embryogenesis and artificial seeds; prospects of Plant Biotechnology in crop improvement; omics technologies and their applications.

### 3. Model questions:

- Classification based on chromosome number is
  - Cytotaxonomy
  - Karyotaxonomy
  - Numerical taxonomy
  - Biochemical taxonomy
- The transfer of electrons through cytochrome b<sub>6</sub>f complex involves:
  - One cyt b, one quinone oxidation reduction site and two Rieske Fe-S proteins
  - Two cyt b, one cyt c, a Rieske Fe-S protein and two quinone oxidation – reduction sites
  - One cyt c, two Rieske Fe-S proteins and two cyt. B
  - Two cyt.b, one cyt, c, two Rieske Fe-S proteins and one quinone oxidation reduction site
- The internal rotenone-insensitive NADH dehydrogenase in mitochondria works as:
  - Non proton pumping bypass when complex-II is overloaded
  - Non proton pumping bypass when complex-I is overloaded
  - Proton pumping channel when complex-I is unloaded
  - None of these
- A conservation ecologist will study
  - Adaptation of organisms to particular substance
  - Population, community and ecosystem ecology
  - Remote sensing
  - Flow of energy within ecosystem
- The protected areas have been categorized on the basis of GIS by
  - UNEP
  - IUCN
  - SAARC
  - CBD

# PET – BASIC SCIENCES

## BUSINESS ADMINISTRATION

### 1. Test Structure

- (a) The question booklet will have two parts: **Part-A** and **Part-B** to be attempted in 3 hours. Weightage for Part-A and Part-B will be 60% and 20%, respectively.
- (b) Part-A will carry 150 multiple choice questions (MCQs) to be attempted on the OMR sheet. Each correct answer will **carry one mark** whereas 1/4 **mark** will be **deducted** for every wrong answer.
- (c) Part-B will contain two subjective type questions to be attempted in the space provided along with the questions in the question booklet.
- (d) Minimum 20% marks are required in the Entrance Test to be called for Counselling/ Interview in Part-A and Part-B, individually.
- (e) Merit list will be prepared on the basis of:
  - i) Performance in the Entrance Examination 80% (60% MCQ + 20% subjective)
  - ii) Master's Research by Thesis & Quality of Thesis 10%
  - iii) Interview 10%

### 2. Syllabus

Research Aptitude and General Awareness: Research methodology, research process, research designs, quantitative and qualitative data, measurement and scaling techniques, questionnaire design, sampling design and procedures, analysis of collected data, hypothesis testing, parametric and non-parametric statistics, factor analysis, cluster analysis and discriminant analysis, report writing. Effective communication, logical and analytical reasoning, data interpretation.

Management: Principles of management and organizational behaviour, development of management thought, organization structure, role of behavioural sciences in organization, organizational development and change. Business Environment: economic, socio-cultural, political & legal and technological environment. Managerial economics, pricing theories, national income concepts, demand theory, theory of production, theory of costs, theories of distribution.

Managerial accounting and control, financial accounting, cost accounting, budget and budgetary control. Financial management, capital budgeting, capital structure and cost of capital, dividend policy, mergers and acquisitions. Marketing management, market segmentation, targeting and positioning, marketing mix, buyer behaviour, marketing potential and forecasting, marketing of services, customer relationship management. Human resource management, recruitment and selection process, training and development, performance appraisal, industrial relations and trade unions.

Production and operations management, production functions, work and job design, facilities planning, product and process selection, facilities location, production planning and control. Strategic management, corporate governance and social responsibility, environmental scanning and industry analysis, strategy formulation, evaluation and control. Management Information System, design and implementation of MIS, Enterprise Resource Planning (ERP). Quantitative and optimization techniques, probability and decision making under risk and uncertainty, optimization models, linear programming, game theory, queuing models.

Project management, formulation of projects, technical and financial feasibility, preparation of feasibility report, implementation of project. Concept and theories of entrepreneurship, entrepreneurship development programmes and role of various institutions in developing entrepreneurship.

### 3. Model Questions:

1. One of the essential characteristics of research is:
  - (A) Replicability
  - (B) Generalizability
  - (C) Usability
  - (D) Objectivity
2. ICT stands for
  - (A) Information common technology
  - (B) Information and communication technology
  - (C) Information and computer technology
  - (D) Inter connected technology
3. What is the basis of monopolistic competition?
  - (A) Product differentiation
  - (B) Agreement among producers
  - (C) Cost of production
  - (D) None of these
4. Out of the following, which one is a source of internal recruitment?
  - (A) Casual Caller
  - (B) Hiring agency
  - (C) Promotion
  - (D) Campus placement
5. Which one of the following is a sales promotion method?
  - (A) Advertising
  - (B) Discount offers
  - (C) Word of mouth
  - (D) Publicity

# PET-BASIC SCIENCES

## CHEMISTRY

### 1. Test Structure

- (a) The question booklet will have two parts: **Part-A** and **Part-B** to be attempted in 3 hours. Weightage for Part-A and Part-B will be 60% and 20%, respectively.
- (b) Part-A will carry 150 multiple choice questions (MCQs) to be attempted on the OMR sheet. Each correct answer will **carry one mark** whereas 1/4 **mark** will be **deducted** for every wrong answer.
- (c) Part-B will contain two subjective type questions to be attempted in the space provided along with the questions in the question booklet.
- (d) Minimum 20% marks are required in the Entrance Test to be called for Counselling / Interview in Part-A and Part-B, individually.
- (e) Merit list will be prepared on the basis of:
- |   |                                |
|---|--------------------------------|
| i) Performance in the Entrance Examination          | 80% (60% MCQ + 20% subjective) |
| ii) Master's Research by Thesis & Quality of Thesis | 10%                            |
| iii) Interview                                      | 10%                            |

### 2. Syllabus

Physical Chemistry: Free energy, entropy and laws of thermodynamics; partial molar properties; thermodynamics of ideal and real gases. Activity, activity coefficients of electrolytes and their determination; Debye-Huckel theory; Debye-Onsager theory of conductance; theories of electrical double layer; Overvoltage potential; derivation of Butler-Volmer equation; Tafel Plot; Electrocatalysis. Hydrogen electrode. Polarography; half wave potential and its significance.

Techniques and Spectroscopy: Types of chromatography; Methods of extraction of organic compounds; Principles of commonly used Instruments; Application of UV, FT-IR, Nuclear Magnetic Resonance spectroscopy and Mass spectrometry for structural Elucidation. Molecular structure-molecular orbital methods for  $H_2^+$  and  $H_2$  molecule; the valence bond description  $H_2$ ; correlation diagram for diatomic molecules. Huckel method for calculating resonance energy, rotation and vibration of molecules-linear and non-linear molecules; Rotational vibrational spectroscopy; electron spectroscopy. Raman Spectroscopy.

Organic Chemistry: Stereochemistry and conformational analysis; Chirality; Asymmetric synthesis; ORD-CD. Selective organic transformations – chemoselectivity, regioselectivity, stereoselectivity, enantioselectivity. Protecting groups. Pericyclic reactions.  $SN_1$  and  $SN_2$ ,  $E_1$  and  $E_2$ , Addition reactions. Molecular rearrangements. Photochemistry. Some modern reactions and reagents.

Agrochemicals and Natural Products: Some important terms used in study of agrochemicals; Synthesis, mode of action, metabolism and structure activity relationship of some common pesticides like insecticides and fungicides. Isolation, structure elucidation, synthesis of common terpenes, steroids, alkaloids and flavonoids.

Inorganic Chemistry: Application of Valence bond, Molecular orbital and VSEPR theories; Group theory. Bioinorganic chemistry; Photosynthesis; Metalloenzymes; Inorganic free radicals-their general reactions, preparation and uses; measurement of free radical concentration and decomposition rate. Hard and soft acids and bases. Supramolecular chemistry.

### 3. Model Questions:

- $H_2$  gas is not liberated when the following metal is added to dilute HCl:  
(A) Mg (C) Ag  
(B) Sn (D) Zn
- Which is a Supramolecule?  
(A) 18-Crown 6 (C) Chlorophyll  
(B) Haemoglobin (D) Both (B) and (C)
- Which of the following is not an electrophile?  
(A)  $CH_4$  (C)  $Br^+$   
(B)  $SO_3$  (D)  $BF_3$
- How many signals in the NMR spectrum are expected from the compound with structure  $CH_3-O-CH_2-CH_3$ ?  
(A) 3 (C) 5  
(B) 4 (D) 8
- Which of the following is not an insecticide?  
(A) Warfarin (C) Methyl Parathion  
(B) Endosulfan (D) Triazofos

# PET – BASIC SCIENCES

## MICROBIOLOGY

### 1. Test Structure

- (a) The question booklet will have two parts: **Part-A** and **Part-B** to be attempted in 3 hours. Weightage for Part-A and Part-B will be 60% and 20%, respectively.
- (b) Part-A will carry 150 multiple choice questions (MCQs) to be attempted on the OMR sheet. Each correct answer will **carry one mark** whereas 1/4 **mark** will be **deducted** for every wrong answer.
- (c) Part-B will contain two subjective type questions to be attempted in the space provided along with the questions in the question booklet.
- (d) Minimum 20% marks are required in the Entrance Test to be called for Counselling / Interview in Part-A and Part-B, individually.
- (e) Merit list will be prepared on the basis of:
- |   |                                |
|---|--------------------------------|
| i) Performance in the Entrance Examination          | 80% (60% MCQ + 20% subjective) |
| ii) Master's Research by Thesis & Quality of Thesis | 10%                            |
| iii) Interview                                      | 10%                            |

### 2. Syllabus

Historical developments of Microbiology. Sterilization, isolation, identification, maintenance, preservation of microorganisms and their common techniques used in microbiology. Systematic position of microorganisms. Prokaryotic and Eukaryotic microorganisms. Brief discussion on fungi, algae and protozoa. Nutrition and growth in bacteria. Biology of viruses. Microbial ecology. Immune response and immunization. Important human diseases.

Microbial growth, Cell membrane structure, permeability and mechanism of nutrient transport. Bacterial endospores. Bioenergetics. Microbial metabolism.

Nature of genetic material in cellular and acellular microorganisms. Microbial mutations. Transformation, Transduction, Conjugation, Bacterial plasmids. Recombinant DNA technology and its application. Strain improvement.

Concept of industrial fermentations. Microbial production of ethanol, beer and wine, enzymes, growth factors and vitamins (B2 and B12). Production of antibiotics. Food preservation, Fermented foods. Single Cell Protein. Food infections and food poisoning.

Plant growth regulators and phytotoxin production by microorganisms. Biofertilizers. Waste treatment and disposal. Cultivation technology of mushrooms. Role of microorganisms in biogeochemical cycles. Microbial transformation of phosphorus, iron, sulfur and micronutrients in soil concept of Rhizosphere. Microbial interferences and extramicrobial relationships. Biodegradation of pesticides and agrochemicals.

### 3. Model Questions:

- Recombinant DNA is:  
(A) A type of DNA in bacteria  
(B) The study of how genes work  
(C) The DNA resulting when DNA of two different organisms are manipulated to produce hybrid DNA  
(D) The use of bacteria in the production of foods
- Which of the following is not distinguishing characteristic of prokaryotic cells?  
(A) They have a single, circular chromosome  
(B) They lack membrane enclosed organelles  
(C) They have cell walls containing peptidoglycan  
(D) They lack a plasma membrane
- Which of the following reactions produces the maximum number of molecules of ATP during aerobic metabolism?  
(A) Glucose  $\longrightarrow$  Glucose-6-P  
(B) Phosphoenolpyruvic acid  $\longrightarrow$  Pyruvic acid  
(C) Glucose  $\longrightarrow$  Pyruvic acid  
(D) Acetyl CoA  $\longrightarrow$  CO<sub>2</sub> + H<sub>2</sub>O
- Isolation of *E. coli* from a stool sample is diagnostic proof that the patient has:  
(A) Cholera  
(B) *E. coli* gastroenteritis  
(C) Salmonellosis  
(D) Typhoid fever
- Which of the following reactions is undesirable in wine making?  
(A) Sucrose  $\longrightarrow$  Ethanol  
(B) Ethanol  $\longrightarrow$  Acetic acid  
(C) Malic acid  $\longrightarrow$  Lactic acid  
(D) Glucose  $\longrightarrow$  Pyruvic acid

# PET – BASIC SCIENCES

## ZOOLOGY

### 1. Test Structure

- (a) The question booklet will have two parts: **Part-A** and **Part-B** to be attempted in 3 hours. Weightage for Part-A and Part-B will be 60% and 20%, respectively.
- (b) Part-A will carry 150 multiple choice questions (MCQs) to be attempted on the OMR sheet. Each correct answer will **carry one mark** whereas 1/4 **mark** will be **deducted** for every wrong answer.
- (c) Part-B will contain two subjective type questions to be attempted in the space provided along with the questions in the question booklet.
- (d) Minimum 20% marks are required in the Entrance Test to be called for Counselling / Interview in Part-A and Part-B, individually.
- (e) Merit list will be prepared on the basis of:
  - i) Performance in the Entrance Examination 80% (60% MCQ + 20% subjective)
  - ii) Master's Research by Thesis & Quality of Thesis 10%
  - iii) Interview 10%

### 2. Syllabus

Evolution and Taxonomy: Evolution, Mendelian laws of inheritance, gene-chromosomal organization, genetic code and gene expression, mutations and recombination. Faunal diversity, nomenclature, classical and quantitative methods of taxonomy.

Cell Biology: Organization and functions of cell membrane and intracellular organelles. Cell division and cell cycle, cell communication and cell signalling.

Anatomy, Physiology and Development: Structural and functional anatomy of different systems of vertebrates and invertebrates. Basic concepts of development, gametes, fertilization, cleavage, early development, differentiation, morphogenesis and organogenesis.

Ecology and Animal Behaviour: Ecological principles, concept of habitat and niche, ecotones, energy flow in ecosystem, food chain, food webs, population and community ecology, ecological succession, environmental pollution. Behaviour, biological rhythms, mimicry, dispersal and migration. Wildlife management and conservation.

Human Welfare: Important organisms in human health and agriculture. Innate and adaptive immune system vaccines and vaccination.

### 3. Model questions

1. Different concentrations of  $\text{Na}^+$ ,  $\text{K}^+$  and organic molecules during resting potential are maintained by an interplay of factor(s):
  - (A) Electrical attractions and repulsions
  - (B) Active transport across the cell membrane
  - (C) Selective permeability of the axon membrane
  - (D) All of these
2. Receptors which transduce sound, touch and pressure are the:
  - (A) Mechanoreceptors
  - (B) Chemoreceptors
  - (C) Thermoreceptors
  - (D) Electromagnetic receptors
3. The inner ear and eye lens are formed from:
  - (A) Mesoderm
  - (B) Ectoderm
  - (C) Endoderm
  - (D) Dorsal mesoderm
4. Carrying capacity of a population is determined by its:
  - (A) Birth rate
  - (B) Death rate
  - (C) Resource limit
  - (D) Growth rate
5. A modification of behaviour towards a stimulus is called:
  - (A) Inherited
  - (B) Learned
  - (C) Intrinsic
  - (D) Innate

# PET – AGRICULTURE

## AGRICULTURAL ECONOMICS

### 1. Test Structure

- (a) The question booklet will have two parts: **Part-A** and **Part-B** to be attempted in 3 hours. Weightage for Part-A and Part-B will be 60% and 20%, respectively.
- (b) Part-A will carry 150 multiple choice questions (MCQs) to be attempted on the OMR sheet. Each correct answer will **carry one mark** whereas 1/4 **mark** will be **deducted** for every wrong answer.
- (c) Part-B will contain two subjective type questions to be attempted in the space provided along with the questions in the question booklet.
- (d) Minimum 20% marks are required in the Entrance Test to be called for Counselling/Interview in Part-A and Part-B, individually.
- (e) Merit list will be prepared on the basis of:
- |   |                                |
|---|--------------------------------|
| i) Performance in the Entrance Examination          | 80% (60% MCQ + 20% subjective) |
| ii) Master's Research by Thesis & Quality of Thesis | 10%                            |
| iii) Interview                                      | 10%                            |

### 2. Syllabus

Theory of consumer behavior, Theory of the firm. Theory of Production. Costs. Forms of markets. Factor pricing, General Equilibrium and Welfare Economics. National Income accounting. Consumption function. Investment and savings.

Output and Employment, Inflation and deflation, Monetary and Fiscal policy, Central banking. Business cycles. Theories of International Trade & WTO, Theories and models of economic growth.

Basic Econometrics and statistics, Linear and non-linear economic models, Ordinary least squares, Indirect least square. Maximum likelihood estimation. Multicollinearity, Heteroscedasticity and autocorrelation. Principal component analysis, Generalized Aitkin's least squares.

Agricultural Production functions, Factors of production, Economies and diseconomies of scale, Agricultural Marketing, Market intermediaries Marketing Efficiency. Vertical and Horizontal integration, Marketing Co-operatives Direct marketing, Contract farming and Retailing. Supply Chain Management Market Infrastructure. Market extension. Price policy. Commodities markets and future trading, Hedging.

Research in social sciences, Types of research. Research prioritization, Research process. Sampling design, Sampling error and methods of sampling. Research design and techniques. Types of data collection tools. Scaling techniques. Coding, Editing, Tabulation and Validation of data. Statistical package for social sciences. Interpretation of results and Report writing.

### 3. Model Questions

- Fiscal Policy is connected with:  
(A) Issue of currency  
(B) Exports and imports  
(C) Public revenue and expenditure  
(D) None of these
- A firm is in equilibrium if:  
(A)  $MR < MC$   
(B)  $MR = MC$   
(C)  $MR > MC$   
(D) None of these
- In classical production function, rational zone is always:  
(A) First zone  
(B) Third zone  
(C) Second zone  
(D) None of these
- World trade organization (WTO) came into existence on:  
(A) 1<sup>st</sup> January 1948  
(B) 1<sup>st</sup> January 1995  
(C) 30<sup>th</sup> October 1947  
(D) 15<sup>th</sup> April 1994
- Which of the following is *not* a type of non-probability sampling?  
(A) Snowball sampling  
(B) Stratified random sampling  
(C) Quota sampling  
(D) Convenience sampling



# PET–AGRICULTURE

## SOCIOLOGY

### 1. Test Structure

- (a) The question booklet will have two parts: **Part-A** and **Part-B** to be attempted in 3 hours. Weightage for Part-A and Part-B will be 60% and 20%, respectively.
- (b) Part-A will carry 150 multiple choice questions (MCQs) to be attempted on the OMR sheet. Each correct answer will **carry one mark** whereas 1/4 **mark** will be **deducted** for every wrong answer.
- (c) Part-B will contain two subjective type questions to be attempted in the space provided along with the questions in the question booklet.
- (d) Minimum 20% marks are required in the Entrance Test to be called for Counselling / Interview in Part-A and Part-B, individually.
- (e) Merit list will be prepared on the basis of:
  - i) Performance in the Entrance Examination 80% (60% MCQ + 20% subjective)
  - ii) Master's Research by Thesis & Quality of Thesis 10%
  - iii) Interview 10%

### 2. Syllabus

Origin, nature, scope and importance of rural sociology. Basic concepts of rural sociology. Rural social structure. Rural-Urban continuum. Rural family. Rural economy. Caste system. Jajmani system. Panchayati raj institution. Religion. Diffusion of innovations. Rural development programmes.

Rural social problems, indebtedness, poverty, declining sex ratio, dowry and labour shortage. Social and cultural change, Factors of social change, demographic, economic, technological and legislative.

Processes of social change, sanskritization and de- sanskritization, westernization, secularization, industrialization, urbanization, modernization and globalization.

Theories of social change, cyclic theories, ancient theories and evolutionary theories.. Sociological theories: Functionalism, Conflict theory, Symbolic interactionism, Phenomenology and Ethno-methodology.

Scientific research, Characteristics, types and methods. Concept, construct and variables. Hypothesis, Logic of enquiry. Research design, Sampling, Data collection: Observation, Interview, Case study, Questionnaire and Interview schedule. Data processing: coding, tabulation and diagrammatic presentation. Statistical analyses: Measures of Central tendencies, Dispersions and Associations. Scaling techniques. Report writing.

### 3. Model questions

1. Which of the following is not rural social problem?
  - (A) Slums
  - (B) Drug addiction
  - (C) Declining sex ratio
  - (D) Poverty
2. Who said that mode of production determines culture?
  - (A) Karl marx
  - (B) Hegel
  - (C) Lundberg
  - (D) Maciver
3. What ended the feudal culture?
  - (A) Growth of International commerce
  - (B) Discovery of sea routes
  - (C) Wars
  - (D) All of these
4. Herbert Spencer's contribution to sociology is:
  - (A) Cultural evolution
  - (B) Organic analogy
  - (C) Social contract
  - (D) Neo-positivism
5. Tentative generalization the validity of which is yet to be tested is called:
  - (A) Proposition
  - (B) Hypothesis
  - (C) Scientific report
  - (D) Synopsis

# PET - HOME SCIENCE

## APPAREL & TEXTILE SCIENCE

### 1. Test Structure

- (a) The question booklet will have two parts: **Part-A** and **Part-B** to be attempted in 3 hours. Weightage for Part-A and Part-B will be 60% and 20%, respectively.
- (b) Part-A will carry 150 multiple choice questions (MCQs) to be attempted on the OMR sheet. Each correct answer will **carry one mark** whereas 1/4 **mark** will be **deducted** for every wrong answer.
- (c) Part-B will contain two subjective type questions to be attempted in the space provided along with the questions in the question booklet.
- (d) Minimum 20% marks are required in the Entrance Test to be called for Counselling / Interview in Part-A and Part-B, individually.
- (e) Merit list will be prepared on the basis of:
- |   |                                |
|---|--------------------------------|
| i) Performance in the Entrance Examination          | 80% (60% MCQ + 20% subjective) |
| ii) Master's Research by Thesis & Quality of Thesis | 10%                            |
| iii) Interview                                      | 10%                            |

### 2. Syllabus

Polymerization. Structure of textile fibers, molecular bonding, length, orientation and requirements of fiber forming substances. Structure- property relations of the fibers- repeating units, bonds, reactive groups and reactions of natural, synthetic, spandex and minor fibers. Action of heat, light, bleach and microorganisms on different fibers. Commercial processes of fibers. Types and characteristics of bi- component and bi-constituent fibers. New fibers. Blending of fibers. Importance of textile testing, standardization and quality control. Functions of BIS and other standards. Effect of moisture and humidity on properties of textiles. Standard conditions of testing. Testing of various textile properties and assessment of other safety aspects in textiles, water permeability, water repellency, wicking, dimensional stability, comfort and fabric handle measurement. Fabric defects. Quality control in spreading, cutting and bundling products. Draping, trueing and surplice. Custom Clothing. Fitting problems related to wrinkles/ creases and pulls of fabric and their remedial measures. Origin of clothing, use of clothing among primitive people. Theories of clothing. Clothing symbolism in relation to customs, traditions, cultural contacts, status, education and role of legislation. Understanding the consumer demand. Consumer resources. Individual differences in consumer behavior. Psychological processes involved in selection of textiles and apparel products. Consumer decision processes and behavior. Consumer analysis and marketing strategies. Market segmentation. Innovation. Counterfeit textiles and consumer protection measures. Global consumer markets. Status of textile and apparel industry in India- cotton, silk, wool, rayon, jute, handloom, hosiery and apparel industry. Government policies on textiles and clothing. Textile Research Associations and Export Promotion Councils. Apparel Parks, Globalization, TUFFS, ISO 9000 and 14000 standards, SWOT Analysis.

### 3. Model Questions

- A dummy is also known as:  
(A) Mannequin (B) Human body  
(C) Dress Form (D) All of these
- Maximum number of jute mills are found in:  
(A) Rajasthan (B) West Bengal  
(C) Uttar Pradesh (D) Punjab
- Which of the following are cultural gatekeepers?  
(A) Magazine editors (B) Reviewers  
(C) Retail buyers (D) All of these
- Following is not a direct system of yarn numbering:  
(A) Cotton Count (B) Metric Count  
(C) Denier (D) Tex
- The coherence of polymer system is not due to:  
(A) Vander Waals' forces (B) Hydroxyl group  
(C) Salt linkage (D) Cross links



# PET - HOME SCIENCE

## FOOD & NUTRITION

### 1. Test Structure

- (a) The question booklet will have two parts: **Part-A** and **Part-B** to be attempted in 3 hours. Weightage for Part-A and Part-B will be 60% and 20%, respectively.
- (b) Part-A will carry 150 multiple choice questions (MCQs) to be attempted on the OMR sheet. Each correct answer will **carry one mark** whereas 1/4 **mark** will be **deducted** for every wrong answer.
- (c) Part-B will contain two subjective type questions to be attempted in the space provided along with the questions in the question booklet.
- (d) Minimum 20% marks are required in the Entrance Test to be called for Counselling / Interview in Part-A and Part-B, individually.
- (e) Merit list will be prepared on the basis of:
- |   |                                |
|---|--------------------------------|
| i) Performance in the Entrance Examination          | 80% (60% MCQ + 20% subjective) |
| ii) Master's Research by Thesis & Quality of Thesis | 10%                            |
| iii) Interview                                      | 10%                            |

### 2. Syllabus

Nutritional requirements and dietary allowances. Factors affecting requirements. Methods of estimation and formulation of recommended allowances of energy, protein, fat, minerals and vitamins for different age and activity groups. Classification, functions, sources, digestion and absorption of carbohydrates, proteins, lipids, essential fatty acids, minerals and vitamins. Composition, functions and role of dietary fibre in various physiological disorders. Methods of assessing protein quality. Deficiency and toxicity of vitamins and minerals. Inter-relationship between vitamins, minerals and hormones. Water and electrolyte balance in human body. Calculations used in preparation of various standard solutions. Sample and sampling techniques. Principles, techniques and applications of colorimeter, spectrophotometer, atomic absorption spectrophotometer, fluorimetry, flame photometry, electrophoresis and chromatography. Introduction to animal assay. Assessment of the nutritional status at individual, household and institutional level using direct and indirect methods. Major nutritional problems of the state, nation and world. Prevalence, etiology, biochemical and metabolic changes in PEM, vitamin A deficiency, iron deficiency anemia and IDD. National nutrition programmes and policies. Nutritional surveillance. Body composition in different physiological conditions and factors affecting it. Importance and factors influencing energy metabolism and physical fitness. Techniques to measure energy expenditure and energy intake. Techniques to assess physical fitness. Aging theories, physiology, mechanism and role of nutrients in arresting aging process. Classification of immunity and immunological responses. Regulation of immunity. Role of carbohydrates, fats, proteins, minerals and vitamins on immune system. Factors affecting acquired immunity. Role of immunization. Effect of probiotics, prebiotics and antioxidants on immune function. Interaction between nutrients, infections and drugs.

### 3. Model Questions:

1. Vitamin A deficiency leads to:
- |                    |                   |
|--------------------|-------------------|
| (A) Osteomalacia   | (B) Keratomalacia |
| (C) Encephalopathy | (D) Neuropathy    |
2. Iodine is an important part of:
- |                |                |
|----------------|----------------|
| (A) Thyroxine  | (B) Thiamine   |
| (C) Tocopherol | (D) Polyphenol |
3. Substance used for primary standards must have high:
- |                      |                       |
|----------------------|-----------------------|
| (A) Atomic weight    | (B) Equivalent weight |
| (C) Molecular weight | (D) Molar ratio       |
4. Immunoglobins present during allergies:
- |         |         |
|---------|---------|
| (A) IgE | (B) IgG |
| (C) IgM | (D) IgA |
5. Low weight for height is known as:
- |                     |                    |
|---------------------|--------------------|
| (A) Under nutrition | (B) Stunting       |
| (C) Wasting         | (D) Over nutrition |

# PET - HOME SCIENCE

## EXTENSION EDUCATION & COMMUNICATION MANAGEMENT

### 1. Test Structure

- (a) The question booklet will have two parts: **Part-A** and **Part-B** to be attempted in 3 hours. Weightage for Part-A and Part-B will be 60% and 20%, respectively.
- (b) Part-A will carry 150 multiple choice questions (MCQs) to be attempted on the OMR sheet. Each correct answer will **carry one mark** whereas 1/4 **mark** will be **deducted** for every wrong answer.
- (c) Part-B will contain two subjective type questions to be attempted in the space provided along with the questions in the question booklet.
- (d) Minimum 20% marks are required in the Entrance Test to be called for Counselling / Interview in Part-A and Part-B, individually.
- (e) Merit list will be prepared on the basis of:
  - i) Performance in the Entrance Examination 80% (60% MCQ + 20% subjective)
  - ii) Master's Research by Thesis & Quality of Thesis 10%
  - iii) Interview 10%

### 2. Syllabus

Research methodology for social sciences, research prioritization and hypothesis: Concept, construct, variables and their measurements. Research design and sampling. Types of data collection tools, reliability and validity. Statistical package for social sciences. Development Communication and theories of communication. Information Management. Characteristics and role of key communicators in development. Role of ICT in communication. Recent advances in communication. Participatory Programme Management. Techniques of participatory planning. Project management techniques. Evaluation techniques. Multimedia-concept and evolution of multimedia. Media production technology. Fundamentals of making multimedia programme. Planning of media products. Ownership pattern. Economics of media organizations. Regulatory mechanism. Extension system in India, Pakistan, UK, USA, Japan and Israel. Special programmes for poor, women and children. Review of five year plans of India. Support structure and their functions-DRDA, NREGP. National level voluntary agencies-CAPART, KVK and ICAR extension systems. Role of international organizations in development. Privatization of extension services.

### 3. Model Questions

1. Beneficiaries of SGSY scheme are known as:  
(A) Entrepreneurs (B) Swarozgaris  
(C) Shilpkar (D) All these
2. Trustworthiness and competency are elements of:  
(A) Credibility (B) Fidelity  
(C) Empathy (D) None of these
3. Selection of objectives and the activities for the achievement of goals is called:  
(A) Planning (B) Organizing  
(C) Leading (D) Coordinating
4. IADP programme was initiated on the recommendations of:  
(A) State government (B) Balwant Rai Mehta Committee  
(C) Dhama & Committee (D) Ford Foundation Team
5. Which among the following is the testable form in a scientific research?  
(A) Research problem (B) Research hypothesis  
(C) Research variable (D) All of these

# PET - HOME SCIENCE

## HUMAN DEVELOPMENT & FAMILY STUDIES

### 1. Test Structure

- (a) The question booklet will have two parts: **Part-A** and **Part-B** to be attempted in 3 hours. Weightage for Part-A and Part-B will be 60% and 20%, respectively.
- (b) Part-A will carry 150 multiple choice questions (MCQs) to be attempted on the OMR sheet. Each correct answer will **carry one mark** whereas 1/4 **mark** will be **deducted** for every wrong answer.
- (c) Part-B will contain two subjective type questions to be attempted in the space provided along with the questions in the question booklet.
- (d) Minimum 20% marks are required in the Entrance Test to be called for Counselling / Interview in Part-A and Part-B, individually.
- (e) Merit list will be prepared on the basis of:
  - i) Performance in the Entrance Examination 80% (60% MCQ + 20% subjective)
  - ii) Master's Research by Thesis & Quality of Thesis 10%
  - iii) Interview 10%

### 2. Syllabus

Theories of Human Development: Psychoanalytic Theory of Sigmund Freud, Psycho-Social Theory of Erikson, Stimulus Response Theories, Piaget's Theory Cognitive Development, Moral Development Theory of Kohlberg and Piaget, Bronfrenbrenner's Ecological Systems Theory, Attachment Theory of Bowlby and Ainsworth. Chomsky's Language Development Theory, Socio-Cultural Theory by Vygotsky. Life Span Development: physical and psycho-motor development, brain development, perceptual development cognition and metacognition, models of intelligence, culture and its impact, emotional maturity, stability and catharsis, vulnerability and resilience, seminal work of Margaret Mead, design and field work of "Six Cultures Project". Methods and Techniques of Assessment in Human Development : anthropometry, sociometry, psychometry, psychological tests, projective techniques, reliability and validity, individual and group test. Human Development Index. Gender Issues and Family Relations: concept of gender, gender theories - Gender orientation theory of Sandra Bem, gender schema theory, theory of ego development and gender, Family solidarity and values, demographic challenges to family ecology. Parent and Community Education: theoretical approaches, techniques for parent and community education, Basic approaches to communication, recent development in communication, parent involvement in community programmes.

### 3. Model Questions

1. Which of the following works on reality principle?
  - (A) The Id
  - (B) The Ego
  - (C) The Superego
  - (D) Instincts
2. Metacognitive knowledge refers to acquired knowledge about:
  - (A) Social processes
  - (B) Physiological processes
  - (C) Cognitive processes
  - (D) Emotional processes
3. The macro system layer in the child's environment comprises of:
  - (A) Family
  - (B) Friends
  - (C) School and health services
  - (D) Customs and cultural values
4. The part of the brain specialized in language processing:
  - (A) Corpus callosum
  - (B) Right hemisphere
  - (C) Left hemisphere
  - (D) Cortex
5. An aid that uses sight and sound to present information to parents and community is known as:
  - (A) Projected-aid
  - (B) Audio-aid
  - (C) Visual - aid
  - (D) Audio-visual aid