

Program Name	Institutes
M.Sc. (Medical) Anatomy M.Sc. (Medical) Biochemistry M.Sc. (Medical) Microbiology M.Sc. (Medical) Pharmacology M.Sc. (Medical) Physiology	Kasturba Medical College (KMC) Manipal Kasturba Medical College (KMC) Mangaluru

## MET 2024 Test Details

- Test Duration: 120 minutes
- Total Questions: 120 covering Zoology (40 questions), Botany (40 questions) and Chemistry & Biochemistry (40 questions)
- Max Marks: **480**
- Marking Scheme: **+4** for every correct answer, **-1** for every wrong answer, 0 for every unanswered question
- No. of Attempt: **1**
- By default, MET 2023 Test fee (Rs.1,400) is collected along with the application fee at the time of Online Application submission.
- Schedule & Mode: Refer [www.manipal.edu/met](http://www.manipal.edu/met) for updates

## ZOOLOGY

**Contribution of scientists to society:** Introduction to biological concepts, Biographies and contributions of scientists: Charaka, Sushruta, Charles Darwin, John Gregor Mendel, Louis Pasteur, A.I. Oparin, J.B.S. Haldane, J. C. Bose, Hermann Joseph Mueller, J.D. Watson, Francis Harry Compton Crick, Har Gobind Khorana, Francois Jacob and Jacques Monod, Marshall W Nirenberg and Frederick Sanger, Barbara McClintock, Venkatraman Ramakrishnan and others

**Trends in animal body evolution** (germ layers, symmetry, body cavity, etc.), **Principles of animal classification, nomenclature and concept of species, General characteristics and classifications:** **Protozoa:** Type study: *Paramecium* (structure and reproduction), **Porifera:** Type study: *Leucosolenia*, types of spicules and cells, water canal systems, **Cnidaria:** Type study: *Obelia* (structure and life cycle), structure of nematocyst, **Platyhelminthes:** Type study: *Fasciola hepatica* (structure and life cycle), **Nematoda:** Type study: *Ascaris* (structure and life cycle), **Annelida:** Type study: *Nereis* (morphology), metamerism, **Arthropoda:** Type study: *Panurgus* (morphology), life cycles of silk worm, **Mollusca:** Type study: *Lamellidens* (shell structure and internal anatomy), **Echinodermata:** Type study: Star fish (morphology), water vascular system, **Fishes:** Type study: *Scoliodon* (morphology), scale types, accessory respiratory organs in fishes, migration in fishes, **Amphibia:** Type study: *Rana tigrina* (morphology), digestive system, urogenital systems and respiratory system, Parental care in Amphibia, **Reptilia:** Amniotic egg, identification of poisonous and non-poisonous snakes, poison apparatus and mechanism of biting, Jacobson's and pit organs, snake venom and its importance, **Aves:** Type study: Ostrich (morphology), flight adaptations, flightless birds, **Mammalia:** Type study: Rat (morphology), dentition in mammals, adaptive radiations in mammals

## BOTANY

**Biodiversity of fauna, importance and its conservation, wild life of India, Morphology:** General characters and classifications of: Cyanobacteria – Nostoc, Fungi: Phycomycetes – *Rhizopus*, Ascomycetes – *Penicillium*, Basidiomycetes- *Puccinia*, Deuteromycetes – *Colletotrichum*, Algae: Xanthophyta – *Vaucheria*, Bacillariophyta – Diatoms, Chlorophyta – *Chlamydomonas*, Phaeophyta – Sargassum, Rhodophyta – Polysiphonia, Lichens: Types, morphology and economic importance, Bryophytes - Riccia, Pteridophytes – Selaginella, Gymnosperms – Cycas, Angiosperms: types of stem, leaf and root modifications, inflorescences and types

**Morphology of flowers and modification for pollinations:** Flower as a modified shoot, flower parts, floral modification for pollination, Microsporogenesis & male gametophyte, megasporogenesis and female gametophyte, monosporic type of development (Polygonum), types of embryo: monocot and dicot.

**Principles of Plant taxonomy:** Branches of taxonomy, principles of nomenclature and its significance, artificial, natural and phylogenetic systems, **Plant Anatomy:** Histology: Meristematic tissues, permanent tissues, simple and complex tissues, parenchyma, collenchyma, sclerenchyma, vascular tissues, types of vascular bundles, Anatomy of root, stem and leaf (dicot and monocot), primary & secondary wall layers, and secondary growth.

**Physiology: Plant-water relations:** Definition of Diffusion, Osmosis, Plasmolysis, Imbibition, Active & Passive absorption, Ascent of sap, Loss of water (Transpiration and Guttation) and Translocation of solutes. **Photosynthesis:** Definition, chemical composition of photosynthetic pigments, absorption and action spectra, mechanism of photosynthesis - light reactions, electron transport, Dark reactions, photorespiration, C4 and CAM pathways, law of limiting factors, chemosynthesis, **Respiration:** Definition and significance, EMP pathway (Glycolysis), Pentose Phosphate pathway, Krebs cycle and electron transport system, ATP synthesis, Anaerobic respiration, Fermentation, R.Q., factors affecting respiration, **Plant Growth:** Definition of growth, phases of growth (cell division, enlargement and differentiation), factors affecting growth rate – External factors – light (photoperiodism) and temperature (vernalization); Internal factors – phytohormones – natural and synthetic – origin and action of hormones. Secondary metabolites - biosynthesis and role, **Plant Pathology:** History of plant pathology, plant disease epidemiology, defence mechanism in plants. Classification, mode of infection, symptoms and control measures for the following pathogens: Virus – TMV, Bacteria - Citrus canker, Fungi – Tikka disease, Nematodes – Root knot disease.

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## CHEMISTRY & BIOCHEMISTRY

**Periodic properties:** Atomic radius, covalent, ionic & van der Waal's radii, ionization energy, electron affinity and electronegativity – definition, trends in periodic table, **Acids and Bases:** Arrhenius, Bronsted-Lowry, Lux-Flood, Solvent system and Lewis concepts of acids and bases with examples. Conjugate acid-base pairs. Limitations of the theories. Hard and Soft Acids and Bases (HSAB): Classification of acids and bases as hard and soft-examples and comparison, Pearson's HSAB concept-acid base strengths and hardness and softness. Electronegativity and hardness and softness – explanation, **Bioinorganic chemistry:** Photosystems, porphyrins, metalloenzymes, oxygen transport, electron-transfer reactions; nitrogen fixation, **Thermodynamics:** Introduction, terminologies associated with thermodynamics, 1st law of thermodynamics, Heat capacity, relation between  $C_p$  and  $C_v$  (no derivation), Joule Thomson effect, 2nd law of thermodynamics, entropy and its significance. Gibbs free energy and Helmholtz free energy, their relationships. Thermodynamics of biological systems - importance of Gibbs free energy,  $G$ , **Ionic Equilibria:** Common ion effect, solubility product and application in salting out soap and purification of common salt, Henderson's equation, buffer solutions, buffer action, buffer capacity, pH values of buffer mixtures, preparing buffers of desired pH, hydrolysis of salts, hydrolysis constants, relationship between  $K_h$ ,  $K_a$ ,  $K_b$  and  $K_w$  for various types of salts, degree of hydrolysis, **Chemical kinetics:** Law of mass action, Rate of reaction, Order and molecularity of reaction, I, II & III order reactions, Derivation of rate equations for I, II and  $n^{\text{th}}$  order reactions, determination of order (differential, half life and isolation methods). Effect of temperature of reaction rates- Arrhenius equation, **Oils, Fats & Waxes:** Composition of oils, fats & waxes, analysis of fats and oils - Acid value, saponification value, iodine value, Polenske value, Reichert-Meissl value, acetyl value, manufacture of soap, cleaning action of soaps & detergents, **QSAR:** The basic concepts of structure activity relationships (SAR) and quantitative structure activity relationships (QSAR), QSAR parameters – Physicochemical parameters Lipophilicity –Electronic parameters, Steric parameters, effect of electronic and steric parameters on lipophilicity. Hansch analysis, significance of slopes and intercepts in Hansch analysis. 3D QSAR approach, **Stereochemistry of Organic Compounds:** Optical isomerism-elements of symmetry, chirality, enantiomers, optical activity, properties of enantiomers- chiral and achiral molecules with two stereogenic centres Eg., Lactic acid and Tartaric acid.. Diastereomers-definition & examples, threo and erythro diastereomers, meso compounds-definition and examples, Resolution of enantiomers – mechanical, chemical and biochemical methods. Relative and absolute configuration, sequence rules, D&L, R&S systems of nomenclature. Geometrical isomerism, cis-trans, E-Z, syn-anti configurations, **Green Chemistry:** Definition and principles, planning a green synthesis in a chemical laboratory, Green preparation-Aqueous phase reactions, solid state (solventless) reactions, photochemical reactions, Phase transfer catalyst catalysed reactions, enzymatic transformations & reactions in ionic liquids. **Biochemistry:** Biomolecules, Carbohydrates: Definition. Classification - monosaccharides (ribose, deoxyribose, glucose, fructose and galactose), oligosaccharides (maltose, sucrose and lactose) and polysaccharides (starch, glycogen, cellulose, pectin, chitin and agar agar). Biological significance,

Proteins: Definition. Classification - simple proteins (albumins, globulins, histones, actin, myosin and keratin), conjugate proteins - Chromoproteins (haemoglobin), glycoproteins (mucin of saliva), phosphoproteins (casein of milk) and lipoproteins (lipovitelline of egg yolk). Biological significance of amino acid and proteins, Lipids: Definition. Classification - Simple lipids - oils (vegetable oil and oil of animal origin), fats (butter) and waxes (beeswax), Compound lipids - phospholipids (lecithin and cephalin) and sphingolipids (cerebrosides), Related compounds - steroids (estrogen, progesterone and testosterone), sterols (cholesterol) and prostaglandins. Biological significance, Nucleic acid: Occurrence, basic chemical composition (nucleoside and nucleotide), type (DNA and RNA) and functions, Enzymes: Definition, properties, classification based on functions. Mode of action - induced fit theory of Koshland, Metabolism of carbohydrates and lipids

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♣ Best of Luck ♣

Updated: 10:15 AM Dec 21 2023