

**SYLLABUS FOR GSAT-2017**  
**FOR ADMISSION TO**  
**B.E.M/ Five Year Integrated M.Sc. Biotechnology/ B.Sc. Programmes**  
**(TEST CODE NO: 106)**  
(Syllabus contains Mathematics, Physics, Chemistry, Biology and Environmental Education)

**1. MATHEMATICS**

**Statements and Sets:** statement, connectives, tautologies & contradictions, set, algebra of sets, disjoint sets, Venn diagrams.

**Functions:** definition, Types of functions: One-One, Onto, One-One Onto, inverse of a function, identity function, constant function.

**Polynomials over integers:** Remainder theorem, Horner's method of synthetic division, quadratic inequalities in one variable, Binomial theorem, middle terms, constant term.

**Real Numbers:** Laws of rational indices, Modulus of a real number, absolute value inequalities (greater than & less than type).

**Progressions:** Arithmetic progression, Geometric progression.

**Analytical Geometry:** points in a plane, distance between the points, mid point, slope of a line, division of a segment internally and externally in a given ratio, area of a triangle given the coordinates of the three vertices, equations of straight lines in the standard forms.

**Trigonometry:** units of measurement of angles, trigonometric ratios & their definitions, behavior, trigonometric identities.

**Statistics:** Arithmetic Mean, Median, Mode, Empirical relation among Mean, Median and Mode.

**Matrices:** definition, addition, subtraction, multiplication, determinant, singular & non-singular matrices.

**Computing:** Algorithm, flow charts.

**2. PHYSICS**

**Physics and Measurement :** S I units, Fundamental, derived units, measuring instruments, Errors in measurement and Significant figures. Dimensions of Physical quantities, analysis and its applications.

**Mechanics :** Newton's Laws of motion, Momentum, Law of conservation of linear momentum. Friction. Work done by a force; kinetic and potential energies, Potential energy of a spring, conservation of mechanical energy, Elastic and inelastic collisions in one and two dimensions.

**Gravitation :**The universal law of gravitation. Acceleration due to gravity, Kepler's laws of planetary motion. Escape velocity. Orbital velocity of a satellite.

**Thermodynamics :** Thermal equilibrium, zeroth law of thermodynamics, Heat, work and internal energy. First, Second law of thermodynamics, thermal expansion; specific heat capacity, latent heat. Conduction, convection and radiation, Newton's law of cooling.

**Oscillations and Waves :** Simple pendulum, resonance. Wave motion. Longitudinal and transverse waves, speed of a wave. Displacement relation for a progressive wave. Principle of superposition of waves, Standing waves in strings and organ pipes, fundamental mode and harmonics, Beats, Doppler effect in sound.

**Electrostatics and Magnetostatics :** Electric field:, Electric flux, Gauss's law. Electric potential, electric dipole. Electrical potential energy of a system. Electric current, Ohm's law, ohmic and non-ohmic resistances, specific resistance, conductance, temperature dependence of resistivity, potentiometer, series and parallel combination of cells. Semiconductor devices. Ampere's law. definition of ampere. Moving coil galvanometer, its current sensitivity, ammeter and voltmeter. magnetic dipole moment. Bar magnet, magnetic field lines; Earth's magnetic field.

**Optics :** Properties of light, Total internal reflection. Deviation and Dispersion of light by a prism, Lens Formula, Magnification, Power of a Lens, Huygens' principle. Dual nature of radiation. Photoelectric effect, Einstein's photoelectric equation; nature of light. de Broglie relation.

### 3. CHEMISTRY

Atomic Structure: Thomson and Rutherford atomic models; Nature of electromagnetic radiation, photoelectric effect; Spectrum of hydrogen atom, Bohr's model; Dual nature of matter, de-Broglie's relation ship, Heisenberg uncertainty principle. Shapes of s, p and d orbitals; Rules for filling electron in orbital.

Chemical Bond: Chemical bond formation. Formation of ionic bonds, factors affecting the formation of ionic bonds; Concept of electro negativity, Fajan's rule, dipole moment; Valency shell Electron Pair Repulsion (VSEPR) theory and shapes of simple molecules— Concept of hybridization involving s, p and d orbitals.

Periodic Table: Modern periodic law, s, p, d and f block elements, periodic trends in properties of elements (atomic and ionic radii, ionization, valence, oxidation states and chemical reactivity)

Acids and Bases: Arrhenius, Bronsted – Lowry and Lewis acid base concepts and their ionization, acid-base equilibria and ionization constants, ionization of water, pH scale, common ion effect, hydrolysis of salts and pH of their solutions, buffer solutions.

Some basic principals of Organic Chemistry: Tetravalency of carbon; Shapes of simple molecules – hybridization (s and p); Classification of organic compounds based on functional groups: -C-C-, -C=C-, and those containing halogens, oxygen, nitrogen and

sulphur; Homologous series; Isomerism – Structural. Nomenclature (IUPAC). general methods of preparation, properties and reactions. Alkanes , Alkenes and Alkynes.

#### **4. BIOLOGY**

Five Kingdom classification – Monera, Protista, Plantae, Fungi and animalia. Nutritional types of microorganisms. Bacteria- structure, nutrition, reproduction and economic importance.

Typical structure of plant cell, functions of plant cell organelles, structure of animal cell and tissues, mitosis and meiosis. Phytohormones. Enzymes – properties and major groups of enzymes

Photosynthesis & Respiration :photosynthetic pigments, light and dark reactions. Glycolysis, Kreb's cycle, Electron transport system.

Digestive system : Animal digestive system, sequences of digestion and absorption. Sources and deficiency diseases of water and fat soluble vitamins.

Excretion: excretory organs in animals and man. Structure and function of Nephron.

Reproduction: Types of reproduction in animals. Ex: Paramecium.

Blood and its components. Blood groups and its importance. Coagulation of blood

Endocrine system: endocrine glands and the role of their hormones in brief.

Biotechnology- Definition and applications. Plant & Tissue Culture.

## **5. ENVIRONMENTAL EDUCATION**

**Man and Environment :** Dimensions of environment – Physical biological and social. Human being and social partner in environmental education, Society and environment in India, Indian traditions customs and culture – past and Present, Population and environment, Impact of human activities on environment.

Environmental problems of urban and rural areas, Natural resources and their depletion. Stress on civic amenities supply of water and electricity, waste disposal, transport, health services. Vehicular emissions, Urbanization – land use housing migrating and floating population Role of society in development – public awareness through education ecoclubs, population education program, campaigns, public participation in decision making.

**Environment and Development:** Economic and social needs – as basic considerations for development, Agricultural and industry as major sectors of environment, Social factors affecting development – Poverty, affluence, education, employment, child marriage and child labour human health – HIV/ AIDS/Social cultural and ethical values. Impact of development on environment – Resource depletion and environmental degradation.

Environmental Pollution and Control, Global Issues: Air, water, Soil, Noise and radiation pollution – sources and consequences. Ozone layer depletion and its effect, Green house effect : global warming and climate changes and their effects on human society, agriculture related diseases, Population related diseases, Disasters – natural and man made their impact on the environment. Strategies for reducing pollution and improving the environment.

**Energy :** Changing global pattern of energy consumption – from ancient to modern times, Rising demand for energy – fossil fuels and fire wood potential (Indian context) and limitations of each source of harnessing and environmental consequences of their use. Conventional energy sources – fossil fuels and firewood. Non – Conventional energy sources – Types of non-conventional sources ( biomass solar wind ocean hydel geothermal, nuclear ). Future sources of energy hydrogen alcohol, fuel cells, Enhancing efficiency of the devices and optimizing energy utilization.

**Sustainable Agriculture:** Need for sustainable agriculture, Green Revolution and its Impact on environment, Impact of agrochemicals on environment, use of bio fertilizers, bio pesticides, biological pest control, integrated pest management, Applications of biotechnology in environment. Management of agricultural produce – storage, preservation, transportation and processing.

## MODEL QUESTIONS

### Mathematics

- The inverse of the function  $f(x) = 3x + 5$  is  
a)  $\frac{x-2}{3}$    b)  $\frac{x+2}{3}$    c)  $\frac{x+5}{3}$    d)  $\frac{x-5}{3}$
- $a^{2/3} [a^{1/3} (a^{1/4})^4] =$   
a)  $a^2$    b)  $a^3$    c)  $a$    d)  $a^4$
- Geometric mean of 6 and 24  
a) 11   b) 12   c) 13   d) 14
- The points  $A(p, 2)$ ,  $B(-3, 4)$ ,  $C(7, -1)$  are collinear then  $p$  is  
a) 1   b) 2   c) 3   d) 4
- The determinant of the matrix  $\begin{vmatrix} 3 & -2 \\ 5 & 8 \end{vmatrix}$   
a) 24   b) -24   c) 34   d) -34

### Physics

- A ray of light is incident normally on one face of a right angled isosceles prism. It then grazes the hypotenuse. The refractive index of the material of the prism is  
A. 1.732   B. 1.5   C. 1.414   D. 1.33
- A block of mass 0.50 kg is moving with a speed of 2.00 m/s on a smooth surface. It strikes another mass of 1.00 kg and then they move together as a single body. The energy loss during the collision is  
A. 0.16 J   B. 1.00 J   C. 0.67 J   D. 0.34 J
- While measuring the speed of sound by performing a resonance column experiment, a student gets the first resonance condition at a column length of 18 cm during winter. Repeating the same experiment during summer, she measures the column length to be  $x$  cm for the second resonance. Then  
A.  $18 > x$    B.  $x > 54$    C.  $54 > x > 36$    D.  $36 > x > 18$
- The temperature where thermo emf is maximum

- A. Neutral temperature      B. Critical temperature      C. Inversion temperature  
D. Maximum temperature

5. Simple harmonic motion is

- A. Periodic      B. Aperiodic      C. Oscillatory      D. anharmonic

### Chemistry

1. The shape of the P-orbital is

- a) Spherical      b) Dumb – bell  
c) Double Dumb bell      d) Circular

2. The type of bond present in NaCl is

- a) Ionic bond      b) Covalent bond  
b) dative bond      d) Hydrogen bond

3) The tendency of an element to lose an electron is called

- a) Electro negativity      b) Non – metallic character  
b) Electropositive character      c) Electron affinity

4) The atom without neutron is

- a) H      b) c      c) He      d) Na

5) The oxidation state of phosphorous is +3 in

- a) Ortho phosphoric acid      b) Phosphorus acid  
c) Meta phosphoric acid      D) Pyro phosphoric acid

### Biology

1. Nucleus was discovered by

- a) Robert Brown      b) Anton Von Leeuwenhoek  
c) Robert Hooke      d) Schleiden

2. Spindle fibers are disappeared during

- a) Prophase      b) Metaphase  
c) Anaphase      d) Telophase

3. Identify the carcinogen

- a) Sugar
- b) Sodium chloride
- c) Tobacco
- d) Milk
- 4. Symbiotic association is seen between
  - a) Rhizobium bacteria – legume plant
  - b) Lichen – algae
  - c) Crabs-Sea anemones
  - d) All the above
- 5. Excretory organ in humans is
  - a) Kidney
  - b) Flame cells
  - c) Nephridia
  - d) Malpighian tubules

### **Environmental Education**

- 1) The work Ecosystem was coined by
  - a. A.G. Tansley
  - b. EP Odum
  - c. Clements
  - d. Clark
- 2) Which one of the following is not an environmental consequence due to urbanization
  - a. Tsunami
  - b. Water pollution
  - b. c. Air Pollution
  - d. Soil Pollution
- 3) Air pollution is contributed by \_\_\_\_\_Sector.
  - a. Industrial
  - b. Automobile
  - c. Both a & b
  - d. None of the above
- 4) Which one of the following is not a green house gas
  - a. CO<sub>2</sub>
  - b. CH<sub>4</sub>
  - b. c. Halo Carbons
  - d. Oxygen
- 5) \_\_\_\_\_ is father of green revolution in India.
  - a. M.S.Swaminathan
  - b. Abdul Kalam
  - c. Salim Ali
  - d. Anna Hazara