UNIVERSITY OF MYSORE

YUVARAJA'S COLLEGE, MYSORE

A college with Potential for Excellence

(Autonomous)

Sl.no.

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(Part – B)

APPLICATION FORM FOR ADMISSION TO 5-YEAR INTEGRATED M.Sc. COURSE IN MOLECULAR BIOLOGY (10 SEMESTERS)

1.	Name of the Applicant (in **Block** Letters)	
2.	Name of the Parent / Guardian	Father : Mother : Guardian :
3.	(a) Place of Birth	Village : Taluk : District : State : PIN :
	(b) Date of Birth (as in the SSLC Marks Card or its equivalent)	Day / Month / Year:
	(c) Tel (with STD/ISD code)/Mobile No.:	
	(d) E-mail:	
4.	Personal Particulars	Nationality : Caste : Sex : Mother Tongue:
5.	Under which category seat is claimed? Please strikeout whichever is not applicable: (Certificate from the competent authority shall be attached, failing which the application will not be considered under that category)	SC /ST / OBC (Cat-1 /Cat-2A /Cat-2B /Cat-3A /Cat-3B) Foreigner /

.....

ACKNOWLEDGEMENT

Sl. No.

Submitted the application form:

No. ..... Dated ..... with necessary enclosures (Xerox Copies)

1. S.S.L.C. & P.U.C. Marks Cards: ..... 2. Caste Certificate: .....

3. Foreigner quota.....

Verified and Checked: ..... *Signature of the Verifying Authority*

6.	(a) Year of Passing PUC/10 + 2/equivalent (c) Percentage of Marks secured	(a) (b)
7.	(a) Total Marks of PCMB (b) Average of PCMB (%) (c) Marks scored in Biology (%)	(a) (b) (c)
8.	Institution last studied	Institution: Date of Admission: Date of completion of degree/PUC/10+2:
9.	Name, occupation and total Annual Income of Parents/ Guardian (If parents not alive)	Name of Father/Guardian: Occupation: Annual income:
10.	(a) Postal Address: (b) Permanent Residential Address:	

DECLARATION

(1) I submit this application seeking admission to 5-Year Integrated M.Sc. Molecular Biology Course (10 Semesters)/M.Sc. in Chemistry. I declare that I have read the rules and regulations in this regard.

(2) I hereby solemnly and sincerely affirm that the statement made and information furnished in my application form and also in the enclosures submitted by me are true. Should it however, be found that any information furnished therein is untrue in material/particulars, I realize that I am liable to criminal prosecution and the seat given to me shall be liable to be forfeited.

Place :

Date :

Signature of Applicant

UNIVERSITY OF MYSORE

Yuvaraja's College, Mysore

(A Constituent Autonomous College of the University of Mysore)

A College with Potential for Excellence

ANNOUNCES

Admission to 5-year Integrated M.Sc. Course in Molecular Biology

A Unique Higher Education Opportunity for PUC/10+2 Passed Students

The college: Yuvaraja's College is an autonomous college of the prestigious University of Mysore, Mysore which is said to be the academic capital of Karnataka. Our college is first among the constituent colleges to attain autonomous status. The college has an excellent infrastructure and well qualified teachers to offer higher education. college has already undertaken more than 35 research projects and more projects are in the pipeline.

The course: Molecular Biology is on the fast expanding frontiers of Biological Sciences. It is a rich multi-disciplinary science combining Cell Biology, Biochemistry, Immunology, Molecular Genetics, Biochemical Techniques, Research Methodology, Computer Application etc. along with combination of Genomics and Bio-informatics which contributes to the understanding of the molecular mechanism of life. Insights, experimental approaches, project orientation and exposure in various scientific institutes help students to receive all round education in this subject. This course has a semester based CBCS scheme will enable the students to explore exciting aspects of Biological Science. This is a five year (ten semester) course under the partially self financing scheme of the University of Mysore. This course is being offered since 2005-06. Some of the students have been placed in reputed research institutes as research assistants. Other students are pursuing their doctoral degree in India and abroad. A few of them have joined Biotech companies.

Faculty: The Staff of Yuvaraja's College and experts from reputed institutes are the members of the faculty. Special lectures, seminars and workshops are arranged regularly to provide knowledge of the cutting-edge progress in the field.

The opportunities: M.Sc. degree holders of this course are eligible to take up assignments and research in premier research institutions of India and abroad. They will also have job opportunities in Pharmaceutical, Biotechnology and other Biology related industries.

Eligibility: Students from all over India, who have completed the Pre-University or equivalent course in the science stream with atleast 45% marks in aggregate (excluding languages) and atleast 45% marks in Biology are eligible. This is relaxable by 5% for SC/ST candidates. They should not exceed 20 years of age as on the date of application and they should not be degree holders of any university. Two seats are exclusively reserved for foreign nationals.

Last date for obtaining application form for the Course from the college office is 10th June 2015 till 3.30pm

Admission procedure: Candidates can obtain application form on payment of Rs. 250/- from the Principal, Yuvaraja's College, Mysore - 570005, Karnataka, India. Alternatively they can also download the application forms from the website: **www.ycm.uni-mysore.ac.in** Filled in application should be accompanied with crossed demand draft for Rs. 300/- (as entrance examination fee) from any nationalized bank drawn in favour of **"The Principal, Yuvaraja's College, Mysore"** Karnataka, India, payable at Mysore together with two recent passport sized coloured photographs, photocopies of supporting documents for age proof (SSLC or Transfer Certificate), caste and income certificate and marks scored in the qualifying examination.

Last date for submission of application form to the college office is 10th June 2015 till 4.30pm

Entrance test: A Compulsory Entrance test will be held at national level. **Entrance test will be conducted at Yuvaraja's College, Mysore.** Syllabus for the entrance test will be available in the college website **www.ycm.uni-mysore.ac.in** Entrance test date will be announced shortly in the above website and also displayd in the notice board of the college. Hall ticket for entrance test will be issued on the morning of the entrance test date.

It will comprise of 50 multiple choice questions for 50 marks. The composition of questions of entrance test is Biology -30, Chemistry -10, Physics -05, Mathematics -05.

Admission process starts shortly for the year 2015 - 16

Total Student Intake is Twenty (20)

For more information contact : The Course Coordinator at +91821 2419236, +91 9448933006
E-Mail: ycmmb2010@gmail.com Website: www.ycm.uni-mysore.ac.in

Admission in to 5 - year Integrated M.Sc., Course in Molecular Biology 2015 - 16.

INFORMATION :

Duration of the course: 5- Years (10 semesters)

Scheme of the course: Semester - CBCS

A compulsory entrance test will be conducted . Date will be announced soon.

Entrance test syllabus is available in the website : www.ycm.uni-mysore.ac.in

Application fee: Rs 250/-

Entrance exam fees: Rs. 300/-

Last date for obtaining application form for Integrated M.Sc. course from the college office by paying the application fee is : 10th June 2015 at 3.30 PM

Last date for submission of application form for Integratedf M.Sc. course is: 10th June 2015 at 4.30PM

Documents to be submitted along with the application form:

Two recent passport sized color photographs, attested copies of SSLC marks card or transfer certificate, PUC / 10 + 2 /equivalent marks card, caste certificate and income certificate (if applicable as per rules and regulations), DD for Rupees 300/- drawn in favour of principlal yuvaraja's college, obtained from any nationalized bank. For the downloaded application forms two separate DD for Rupees 250/-(towards application form fee) + Rupees 300/- (towards entrance examination) should be enclosed.

Entrance exam date will be uploaded in the above website and also will be displayed in the notice board of the college:

Hall ticket for the entrance examaination will be issued on the morning of entrance exam date.

For more information contact: Principal, Yuvaraja's College at 0821 - 2419292

The Course Co - ordinator at 0821 2419236, 9448933006

E-Mail: ycmmb2010@gamail.com

Course Co – ordinator Principal

Annexure 1.

Entrance Examination for integrated Molecular Biology

Duration of the course: 10 semesters
Duration of Entrance Examination: 1 Hr
Pattern: 50 Multiple choice questions of I mark each
Biology - 30, Chemistry-10, Physics -5 and Mathematics 5 questions
Syllabus: Based on Karnataka state Pre University Course Syllabus (XI and XII) (Both 1 and 2 year)

Syllabus :

BIOLOGY

UNIT I: CELL: STRUCTURE AND FUNCTION - Cell and its three major parts: Cell Membrane, cytoplasm, nucleus - Cell theory and the cell as the basic unit of life - Structure of the Prokanyotic and eucaryotic cell - Plant cell and animal cell (brief) - Cell Organelles:Cell envelope, cell membrane, cell wall structure and function: mitochondria, Golgi bodies/dictyosomes, endoplasmic reticulum, ribosomes, lysosomes, vacuoles, plastids, microbodies - Cytoskeleton, cilia, flagella, centrioles (Ultrastructure and function) - Nucleus: nuclear membrane, chromatin, nucleolus - Chemical constituents of living cells - Biomolecules: Structure and functions of carbohydrates, proteins, fats, lipids and nucleic acids - Enzymes: types, properties, function and enzyme action - Cell division: Cell cycle, significance of, and differences between Mitosis and Meiosis

UNIT II: PLANT PHYSIOLOGY Movement of water, food, nutrients and gases - Absorption of water, gases and nutrients - Cell to Cell transport - Diffusion, facilitated diffusion, active transport - Plant-Water Relations - Imbibition, water potential, osmosis, plasmolysis - Long Distance Transport - Apoplant, symplast, root pressure, transpiration pull - Transportation and Guttation - Opening and closing of stomata - Role of K+ ions -Uptake of mineral and their translocation - Transportation through xylem and phloem -Plants and mineral nutrition - Essential minerals, macro- and micronutrients and their role - Defficiency symptoms - Mineral toxicity - Elementry idea of Hydroponics as a Method to study mineral nutrition - Nitrogen metabolism: Nitrogen cycle, biological nitrogen fixation -Plants Respiration - Exchange of gases - Cellular respiration: glycolysis, fermentation (anaerobic) - Energy Relation: Number of ATP molecules generated - Amphibiotic pathways - Respiratory quotient of nutrients - Photosynthesis - Autotropic nutrition - Site of photosynthesis - Photosynthetic pigments (Elementary idea) - Photosynthetic and biosynthetic phases of photosynthesis - Cyclic and non-cyclic photophosphorylation - Chemismotic hypothesis - Phototrespiration - C and C pathways - Factors affecting photosynthesis - Law of Limiting Factors -Plant Growth and Development - Phases of plant growth and plant growth rate - Condition fo Growth - Differentiation, dedifferentiation and redifferentiation - Sequence of developmental process in a plant cell -

Growth regulators: auxin, gibberellin, cytokinin, ethylene, ABA - Photomorphogenesis including brief account of phytochromes (Elementary Idea) - Seed germination - Seed dormancy - Vermalisation – Photoperiodism

UNIT III: HUMAN PHYSIOLOGY: Digestion and Absorption - Human alimentary canal and Digestive glands - Role of digesitive enzymes and gastrointestinal hormones - Peristalsis - Digestion, absorption and assimilation of proteins, carbodydrates and fats - Calorific value of proteins, carbodydrates and fats - Egestion - Nutritional and digestive disorders – P E M, indigestion, constipation, vomiting, jaundice Breathing and Respiration - Respiratory organts in animals (Recall only) - Respiratory system in humans - Mechanism of Breathing and its regulation in humans - Exchange of gases, transport of gases and regulation of respiration in humans - Respiratory volumes - Disorders related to respiration – Asthma, Emphysema, Occupational Respiratory disorders Body fluids and Circulation - Composition of blood, Blood groups, Coagulation of blood - Composition of Lymph and function - Human circulatory system - Structure of human heart and blood vessels - Cardiac cycle, Cardiac output, ECG - Double circulation - Regulation of cardiac activity - Disorders of circulatory system – Hypertension, Coronary artery disease, Angina pectoris, heart failure Excretory products and their elimination - Modes of excretion – Ammonotelism, ureotelism, uricotelism - Human excretory system-structure and function - Urine formation, Osmoregulaion
- Regulation of kidney function, Renin-angiotensin, Antinatriuretic factor, ADH and Diabeters insipidus - Role of other organs in excretion - Disoders – Uraemia, Renal failure, Renal calculi, Nephritis - Dialysis and artificial kidney Locomotion and Movement - Types of movement – ciliary, flagellar, muscular - Skeletal muscle _ contractile proteins and muscle contraction - Skeletal system and its functions. - Joints - Disorders of muscular and skeletal system – Myasthenia gravis, Tetany, Muscular dystrophy, Arthritis, Osteoporosis Gout

Unit IV: Neural control and coordination - Neural and nerves - Nervous system in humans - Central Nervous system, Peripheral Nervous system and Viseral Nervous system - Generation and conduction of nerve impulse - Reflex action - Sensory Perception - Elementary structure and function of eye and ear and general idea of other sense organs Chemical coordination and regulation - Endocrine glands and hormones - Human endocrine system – Hypothalamus, Pituitary, Pineal, Thyroid, Parathyroid, Adrenal, Pancreas, Gonads - Mechanism of hormone action (Elementary Idea) - Role of hormones as messengers and regulators - Hypo- and hyperactivity and related disorders, (Common disorders eg. Dwarfism, Acromegaly, Cretinism, goiter, exopthalmic goiter, diabetes, Addison's disease)

Unit V: GENETICS AND EVOLUTION

 Heredity and variation - Mendelian Inheritance - Deviations from Mendelism, incomplete dominance Co-dominance, Multiple alleles and Inheritance of blood group, pleiotropy.

- Elementary idea of Polygenic Inheritance - Chromosome theory of inheritance - Chromosomes and genes.
 Sex determination - In humans, birds, honey bee. - Linkage and crossing over. - Sex linked inheritance-Haemophilla, Colour blindness.
 Medellin disorders in humans - Chromosomal disorders in humans. - Down's syndrome, Turner's and klinefelter's syndromes.
 Search for genetic material and DNA as genetic material. - Structure of DNA and RNA - DNA packaging - DNA replication - Central dogma - Transcription, genetic code, translation. - Gene expression and regulation. - Genome and human genome project. - DNA finger printing.

EVOLUTION

Origin of life ,Biological evolution and evidences for biological evolution (Paleontological from comparative anatomy and embryology and molecular evidence) - Darwin's contribution /Modern Synthetic theory of Evolution - Hardy – Weinberg's principle. Mechanism of evolution – Variation (Mutation & Recombination) and Natural Selection with examples drift types of natural slection - Gene flow and genetic - Adaptive Radiation Human evolution

Unit VI : **ECOLOGY AND ENVIRONMENT**

Meaning of ecology, environment, habitat and niche - Organisms and environment.
Population and ecological adaptations - Population Interactions – mutualism, competition, predation, parasitism. - Population attributes – growth, brith rate and death rate, - Age distribution.

Ecosystems

Patterns, components, energy flow, nutrient cycling (carbon and phosphorous), decomposition and producitivity - Pyramids of number, biomass, energy. - Ecological succession - Ecological Services: Carbon fixation, Pollination, Oxygen release

Biodiversity and its conservation - Threats to and need for biodiversity conservation. - Hotspots, endangered organisms, extinction, Red Data Book. - Biodiversity conservation-biosphere reserves, national parks and sanctuaries.

Environmental Issues - Air Pollution and its control - Water pollution and its control - Agrochemicals and their effects - Solid waste management - Radioactive waste management - Greenhouse effect and global warming - Ozone depletion, deforestation. - Any three case studies as success stories addressing environmental issues.

Chemistry

Unit VII: Atomic Structure: Thomson's model, Rutherford's model, Bohr's model and their limitations. Concept of shells/subshells, dual nature of matter and light, de Broglie's relationship, Heisenberg uncertainty principle, concept of orbitals, Quantum numbers and their significance, shapes of orbitals. Aufbau principle, Pauli Exclusion Principle, Hund's rule, electronic configuration, stability of half filled and completely filled orbitals.

Periodic table: Classification of Elements, periodicity, modern periodic law. Periodic trends of elements -atomic radii, ionic radii. Ionization energy, electron affinity and electronegativity.

Chemical Bonding: Ionic bond, covalent bond: bond parameters. Lewis structures, polar character of covalent bond, covalent character of ionic bond, valence bond theory, geometry of

covalent molecules, VSEPR theory and hybridization. MOT of homo nuclear diatomic molecules, hydrogen bond.

Unit VIII: **Electrochemistry** - Redox reactions, conductance in electrolytic solutions, specific and molar conductivity variations with concentration, Kohlrausch's Law, electrolysis and laws of electrolysis (elementary idea), dry cell-electrolytic cells and Galvanic cells, lead accumulator, EMF of a cell, standard electrode potential. Nernst equation and its application to chemical cells, Relation between Gibbs energy change and emf of a cell, fuel cells, corrosion.

Co-ordination compounds: Introduction, ligands, co-ordination number, colour, magnetic properties and shapes, IUPAC nomenclature. Bonding (Werner's theory, VBT and CFT); Structural and stereo isomerism, importance of co-ordination compounds (in qualitative inclusion of analysis, extraction of metals and biological systems).

Biomolecules: Carbohydrates-Classification and their importance, D-L configuration. Proteins: Elementary idea of α-amino acids and peptide bond. Polypeptides; proteins- primary, secondary and tertiary structure of proteins. Denaturation of proteins and enzymes. Lipids and hormones-classification and functions. Vitamins-Classification and functions. Nucleic Acids: DNA & RNA

Physics

Unit IX: Laws of Motion Intuitive concept of force. Inertia, Newton's first law of motion; momentum and Newton's second law of motion; impulse; Newton's third law of motion. Law of conservation of linear momentum and its applications. Equilibrium of concurrent forces. Static and kinetic friction, laws of friction, rolling friction. Dynamics of uniform circular motion: Centripetal force, examples of circular motion (vehicle on level circular road, vehicle on banked road)

Work, Energy and Power Scalar product of vectors. Work done by a constant force and a variable force; kinetic energy, work-energy theorem, power. Notion of potential energy, potential energy of a spring, conservative forces: conservation of mechanical energy (kinetic and potential energies); non-conservative forces: elastic and inelastic collisions in one and two dimensions.

Optics Ray Optics (Geometric Optics): Reflection of light, spherical mirrors, mirror formula. Refraction of light, total internal reflection and its applications, optical fibers, refraction at spherical surfaces, lenses, thin lens formula, lens-maker's formula. Newton's relation: Displacement method to find position of images (conjugate points) Magnification, power of a lens, combination of thinlenses in contact, combination of a lens and a mirror. Refraction and dispersion of light through a prism. Scattering of light-blue colour of the sky and reddish appearance of the sun at sunrise and sunset. Elementary idea of Raman effect. Optical instruments: Human eye, image formation and accommodation, correction of eye defects (myopia, hypermetropia, presbyopia and astigmatism) using lenses. Microscopes and astronomical telescopes (reflecting and refracting) and their magnifying powers. Wave optics (Physical Optics): Wave front and Huygens principle, reflection and refraction of plane wave at

a plane surface using wave fronts. Proof of laws of reflection and refraction using Huygens, principle interference. Young's double slit
experiment and expression for fringe width, coherent sources and sustained interference of light. Diffraction due to a single slit, width of central maximum. Resolving power of microscopes and astronomical telescopes. Polarization, plane polarized light; Brewster's law, uses of plane polarized light and polaroids.

Mathematics

Unit X: Straight Lines: Brief recall of 2D from earlier classes. Slope of a line and angle between two lines. Various forms of equations of a line: parallel to axes, point-slope form, slope-intercept form, twopoint form, intercepts form and normal form. General equation of a line. Distance of a point from a line.

Mathematical Reasoning: Mathematically acceptable statements. Connecting words/ phrases - consolidating the understanding of "if and only if (necessary and sufficient) condition", "implies", "and/or", "implied by", "and", "or", "there exists" and their use through variety of examples related to real life and Mathematics. Validating the statements involving the connecting wordsdifference between contradiction, converse and contrapositive.

STATISTICS & PROBABILITY 1. Statistics: Measure of dispersion; mean deviation, variance and standard deviation of ungrouped/grouped data. Analysis of frequency distributions with equal means but different variances. 2. Probability: Random experiments: outcomes, sample spaces (set representation). Events: occurrence of events, 'not', 'and' and 'or' events, exhaustive events, mutually exclusive events Axiomatic (set theoretic) probability, connections with the theories of earlier classes. Probability of an event, probability of 'not', 'and' & 'or' events.

ENTRENCE EXAM QUESTION PAPER 2014 - 15

PART –A Biology

1. Polyblend is
   a) A fine powder of recycled modified plastic
   b) A mixture of inorganic fertilisers, pesticides and herbicides that increases crop production
   c) A mixture of cattle excreta, compost, etc., that is used in organic farming
   d) A mass of bacteria associated with fungal filaments to form mesh like structures that is produced during sewage treatment

2. If 'R' and 'r' are the two alternate forms (alleles) of a gene for a particular trait, which of the following crosses would produce homozygotes and heterozygotes in 1:1 ratio ?
   a) RR x Rr only
   b) Rr x Rr only
   c) Rr x Rr and Rr x rr only
   d) Rr x Rr, RR x Rr and Rr x rr

3. Which of the following is a common feature of both *Escherichia coli* and *Euglena* ?
   a) Absence of cell wall
   b) Presence of membrane bound cell organelles
   c) Presence of chromosome
   d) Absence of nuclear membrane

4. Net primary productivity is
   a) The rate of production of organic matter during photosynthesis
   b) The available biomass (in producers) for the consumption to heterotrophs
   c) The rate of formation of new organic matter by herbivores and carnivores
   d) The rate of biomass (organic matter) production by all the phototrophs on earth

5. In 'Kleinfelters syndrome', the chromosome combination is
   a) 22 pairs of autosomes + XYY
   b) 22 pairs of autosomes +XXY
   c) 22 pairs of autosomes +XXX
   d) 22 pairs of autosomes + XY + 1 extra autosome

6. Histones are rich in the amino acids
   a) Lysine and Arginine
   b) Arginine and Valine
   c) Valine and Cysteine
   d) Lysine and Cysteine

Space for Rough Work

7. In DNA fingerprinting,
   a) Gel electrophoresis is used for restriction digestion of DNA sample
   b) DNA fragments are transferred to nitrocellulose membrane by blotting (Southern blotting) technique
   c) Restriction endonucleases are used for the isolation of DNA from samples like blood cells, hair follicles, saliva, etc.
   d) DNA probe is dsDNA of known sequence that is labelled with radioactive isotopes

8. A natural stagnant water body like a pond or a lake undergoes natural ageing due to
   a) Excessive growth of planktonic algae (algal bloom)
   b) Accumulation of toxic substances like mercury, cadmium, lead, etc.
   c) Accumulation of nutrients like nitrates and phosphates
   d) Release of super heated water or thermal waste water

9. In sexually reproducing organisms, the genetic constitution of gametes is decided in
   a) Metaphase of mitosis
   b) Metaphase I of meiosis
   c) Anaphase I of meiosis
   d) Anaphase II of meiosis

10. Match the hormones given under Column I with their functions listed under Column II; choose the appropriate option from the given choices.

	COLUMN I		COLUMN II
A	Cholecystokinin	**p**	Increases blood calcium levels
B	Thymosin	**q**	Produces anti-inflammatory reactions
C	Parathyroid hormone	**r**	Helps in reabsorption of sodium ions and water in the renal tubules
D	Cortisol	**s**	Helps in the differentiation of T – lymphocytes
		t	Influences the secretion of pancreatic enzymes

   a) A-s, B-p, C-q, D-r
   b) A-r, B-s, C-p, D-t
   c) A-t, B-p, C-s, D-q
   d) A-t, B-s, C-p, D-q

11. Sickle cell anaemia is due to the mutation of
   a) CTC to CAC
   b) CGC to CAC
   c) CTG to CAG
   d) CAG to CTC

Space for Rough Work

12. DNA having labelled thymidine is allowed to replicate in a medium having non-radioactive thymidine. After three duplications, the number of DNA molecules having labelled thymidine shall be
    a) One
    b) Two
    c) Four
    d) Eight

13. Identify the incorrect statement from the following;
    a) During photorespiration, there is release of CO_2 and no synthesis of ATP or NADPH
    b) Chemiosmosis requires a selectively permeable membrane, a proton pump, a proton gradient and ATPase
    c) Bundle sheath cells of C_4 plants are characterised by having very few chloroplasts, thin walls and large intercellular spaces
    d) The first stable compound formed during carbon fixation in Hatch and Slack pathway is oxaloacetic acid

14. Green house effect occurs because green house gases like CO_2, CH_4, N_2O and CFCs can absorb
    a) UV radiations
    b) Long wavelength IR radiations
    c) Visible light radiations
    d) Gamma radiations

15. During nitrogen cycle, ammonia is oxidized to nitrite by
    a) *Nitrococcus*
    b) *Nitrobacter*
    c) *Pseudomonas*
    d) *Thiobacillus*

16. In which of the following organisms, the primary transcript that is produced during transcription has to undergo modifications before it is translated ?
    a) *Escherichia coli*
    b) *Nostoc*
    c) Yeast
    d) *Oscillatoria*

17. Snow blindness is the consequence of
    a) Pollutants released from textiles and iron and steel industries
    b) Oxides of sulphur and nitrogen present in the environment
    c) Accumulation of ozone in the troposphere
    d) Harmful chemicals released into the atmosphere by refrigerators and aerosols

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Space for Rough Work

18. In *Antirrhinum* species (snapdragon), true bred red and white flowered plants are crossed. In F_2 generation, they form
    a) 75% red & 25% white flowered plants
    b) 25% red & 75% white flowered plants
    c) 50% red & 50% white flowered plants
    d) 25% red, 50% pink & 25% white flowered plants

19. Stenohaline organisms are organisms which are
    a) Restricted to a narrow range of salinities
    b) Quite adaptable to a wide range of salinities
    c) Not adaptable to even very narrow fluctuations in light intensities
    d) Capable of tolerating temperature fluctuations in a wide range

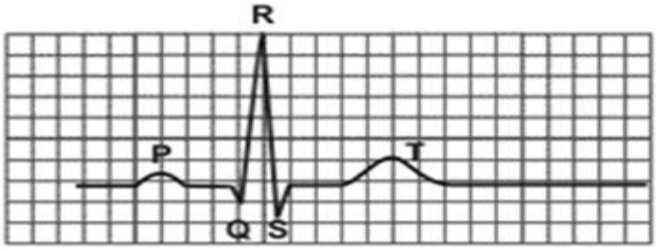
20. A true breeding pea plant producing round seeds is crossed with a pure plant producing wrinkled seeds. Allele for round seed is dominant. After self pollinating the plants of first filial generation, the proportion of plants producing wrinkled seeds in the progeny would be
    a) 1/4
    b) 1/3
    c) 1/2
    d) 3/4

21. Identify the step in Tricarboxylic acid cycle during which substrate level phosphorylation occurs;
    a) Pyruvic acid → Acetyl CoA
    b) Alpha ketoglutaric acid → Succinic acid
    c) Citric acid → Alpha ketoglutaric acid
    d) Malic acid → Oxaloacetic acid

22. In a nucleoside, the pentose sugar is linked to the nitrogenous base by
    a) Phosphoester linkage
    b) Phosphoanhydride linkage
    c) Amide linkage
    d) N-glycosidic linkage

Space for Rough Work

23. The diagrammatic representation of a standard ECG is given below. Based on this, identify the correct statement;



a) The P-wave represents the depolarization of the atria, which leads to the contraction of both the atria
b) The QRS complex represents the repolarisation of the ventricles, which initiates the ventricular diastole
c) The T-wave represents the depolarization of the ventricles leading to their systole
d) The end of T wave marks the end of diastole and the beginning of the systole of the ventricles

24. Match the components of Lac operon of *Escherichia coli* and choose the correct combination;

	COLUMN I		COLUMN II
A	Structural gene	**p**	Binding site for repressor protein
B	Operator gene	**q**	Codes for repressor protein
C	Promoter gene	**r**	Induces lactose transport from the medium
D	Regulator gene	**s**	Codes for enzyme proteins
		t	Binding site of RNA polymerase

a) A-q, B-t, C-p, D-r
b) A-r, B-s, C-t, D-p
c) A-s, B-p, C-t, D-q
d) A-t, B-s, C-q, D-p

25. Identify the incorrectly matched pair from the following;
a) Clown fish and sea anemone - Commensalism
b) Monarch butterfly and bird – Predation
c) Wasps and fig trees – Mutualism
d) Cattle egret and cattle – Amensalism

26. Western Ghats come under "hot spots" category because of
a) High elevation and very high species richness
b) Tropical climate and species evenness
c) Evergreen forest and absence of seasonal fluctuations
d) High endemism and very high species richness

Space for Rough Work

27. The sex determination mechanism / mechanisms in which male heterogamety is observed is / are
    a) XX − XY type only
    b) XX − XY type and ZZ − ZW type
    c) XX − XY type and XX − XO type
    d) XX − XO type and ZZ − ZW type

28. RNA polymerase II is responsible for the transcription of
    a) hnRNA
    b) rRNA
    c) tRNA
    d) snRNA

29. Renin is secreted by
    a) Chief cells of of the stomach wall
    b) Juxtaglomerular apparatus of nephron
    c) Adrenal medulla
    d) Parietal / oxyntic cells of the stomach wall

30. Two pea plants were subjected to cross pollination. Of the 214 plants produced after germination of seeds in the next generation, 108 plants were found to be tall and 106 plants were found to be dwarf. The genotypes of the two parental plants are likely to be
    a) Tt and tt
    b) Tt and Tt
    c) TT and tt
    d) TT and TT

PART B. Chemistry

31. The pH value of the solution at which a particular amino acid does not migrate under the influence of an electric field is called as
    a) Isoelectric point
    b) Eutectic point
    c) Neutralisation point
    d) Effusion point

32. The pyrimidine bases present in DNA are
    a) Cytosine and Adenine
    b) Cytosine and Guanine
    c) Cytosine and Thymine
    d) Cytosine and Uracil

Space for Rough Work

33. The IUPAC name of $[Co(NH_3)_4Cl_2]Cl$ is
    a) Dichlorotetramminecobalt(III)chloride
    b) Tetramminedichlorocobalt(III)chloride
    c) Tetramminedichlorocobalt(II)chloride
    d) Tetramminedichlorocobalt(IV)chloride

34. 2,4-dinitrophenyl hydrazine is an example for
    a) Tridentate ligand
    b) Monodentate ligand
    c) Polydentate ligand
    d) Didentate ligand

35. A smuggler cannot carry gold by depositing iron on the gold surface because
    a) Gold is denser
    b) Iron rusts
    c) Gold has higher reduction potential than iron
    d) Gold has lower reduction potential than iron

36. An element has three electrons in the 4^{th} shell, the atomic number of the element is
    a) 13 b) 21 c) 27 d) 31

37. The most electronegative element in the periodic table is
    a) Nitrogen
    b) Oxygen
    c) Chlorine
    d) Fluorine

38. The correct set of four quantum numbers for the valence electron of rubidium atom (Z = 37) is
    a) 5,0,0, +½
    b) 5,1,0, +½
    c) 5,1,1, +½
    d) 6,0,0, +½

39. The shape of ammonia molecule is
    a) Triangular
    b) Tetrahedral
    c) Pyramidal
    d) Octahedral

40. The percentage s-character of the hybrid orbitals in methane, ethene and ethyne are respectively
    a) 25,50,75 b) 25,33,50 c) 10,20,40 d) 50,75,100

Space for Rough Work

PART C Physics

41. The linear movement of a body depends on time as $p+at^2+bt$, where a and b are constants. What is the force acting on the particle at t=0?

    a) b b) 2a c) 2a+b d) 2ab

42. A cricket ball is hit at 60^o to the horizontal with kinetic energy k. When the ball is at a highest point, its kinetic energy will be,

    a) Zero b) k/4 c) k/2 d) 3k/4

43. What will be the wavelength of sodium light in glass if it is 589.3nm in air? The refractive index of glass is 1.5.

    a) (589.3 X 1.5) nm b) (589.3/1.5) nm c) 589.3 nm d)5

44. The amplitude of the light waves emerging from the two slits in young's experiment is in the ratio of 2:3. The intensity of the minimum to that of the maximum will be in the ratio of;

    a) 1:2 b) 1:4 c) 1:9 d) None of these

45. A Nicol prism is based on the action of,

    a) double refraction
    b) refraction
    c) dichrosism
    d) both (a) and (c) above

Space for Rough Work

PART –D Mathematics

46. If p is the length of the perpendicular from the origin on the line whose intercepts are 'a' and 'b' then $1/a^2 + 1/b^2$ is

    a) 2p b) $2p^2$ c) 1/p d) $1/p^2$

47. The angle between 2x + 3y -7 =0 and x+ y -8 =0 is

    a) $\tan^{-1}(3/4)$ b) $\tan^{-1}(3/5)$ c) $\tan^{-1}5$ d) $\tan^{-1}(1/5)$

48. Which statements are contra positive of each other

    i) If x is a prime then x is odd

    ii) If x is odd then x is a prime

    iii) If x is not odd then x is not a prime

    a) i and ii b) i and iii c) ii and iii d) all the three

49. The arithmetic mean of the series $1,2,2^2,2^3,.....2^{n-1}$

    a) $2^n/n$ b) $\frac{2^n-1}{n}$ c) $\frac{2^n+1}{n}$ d) 2^n

50. The probability that a leap year selected at random contains 53 Sunday is

    a) 7/366 b) 26/183 c) 1/7 d) 2/7

Space for Rough Work

ANSWER KEY

Q NO.	ANSWER	Q NO.	ANSWER	Q NO.	ANSWER
1	a	18	d	35	c
2	d	19	b	36	d
3	c	20	a	37	d
4	b	21	b	38	a
5	b	22	d	39	c
6	a	23	a	40	b
7	b	24	c	41	a
8	c	25	d	42	b
9	c	26	d	43	b
10	d	27	c	44	d
11	a	28	a	45	d
12	b	29	b	46	d
13	c	30	a	47	d
14	b	31	a	48	a
15	a	32	c	49	b
16	c	33	b	50	d
17	d	34	b		