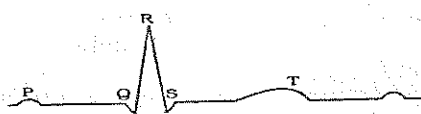




- Q.1 Identify the process by which a variety of Mung bean is developed having resistance to yellow mosaic virus and powdery mildew.
a) hybridization b) selection c) inbreeding d) mutation
- Q.2 Who proposed "Ontogeny recapitulates phylogeny"
a) Ernst Haeckel b) Charles Darwin c) J B Lamarck d) Hugo de vries
- Q.3 Human blood group is example of :
a) co-dominance as well as multiple alleles b) incomplete dominance c) dominance d) epistasis
- Q.4 Down's syndrome is a result of extra 21st chromosome is due to:
a) aneupoidy b) euploidy c) polyploidy d) deletion
- Q.5 One of the structures mentioned below do not take part in excretion in cockroach
a) uricose glands b) fat bodies c) malphigian tubules d) hepatic caecae
- Q.6 In the embryos of a typical dicot and grasses, true homologous structures are
a) coleorhiza & coleoptile b) coleoptile & scutellum c) cotyledons & scutellum d) hypocotyl & radical
- Q.7 In the F₂ generation of Mendelian dihybrid cross the number of phenotypes and genotypes are
a) phenotype - 4, genotype - 16 b) phenotype - 9, genotype - 4 c) phenotype - 4, genotype - 8 d) phenotype - 4, genotype - 9
- Q.8 Some important events in the human female reproductive cycle are given below. Arrange the events in a proper sequence
a - secretion of FSH, b - growth of corpus luteum, c - growth of follicle and oogenesis, d - ovulation, e - sudden increase in the levels of LH
a) ADCEB b) BACDE c) CADBE d) ACEDB
- Q.9 Lactobacilli grows in milk and converts milk into curd with improved nutritional quality by increasing
a) Vitamin A b) Vitamin B₁₂ c) Vitamin B₆ d) Vitamin C and A
- Q.10 Diaphragms are contraceptive devices used by the females, choose the correct option from the statements given below.
1. They are introduced into the uterus
2. They are placed to cover the cervical region
3. They act as physical barrier for sperm entry
4. They act as spermicidal agent
a) 1 and 2 b) 1 and 3 c) 2 and 3 d) 3 and 4
- Q.11 Which of the following would appear as the pioneer organisms on bare rocks
a) liverworts b) mosses c) green algae d) lichens
- Q.12 In history of biology, Human genome project lead to the development of
a) biotechnology b) biomonitoring c) bioinformatics d) biosystematics
- Q.13 Phellogen and phellem respectively denote
a) cork and cork cambium b) cork cambium & cork c) cork and secondary cortex d) secondary cortex and cork
- Q.14 Human ear is sensitive to sound intensity levels
a) -10 to 120 dB b) 0 to 80 dB c) 60 to 20 dB d) -20 to 180 dB

- Q. 15 The loose connective tissue beneath the skin comprises of
 a) areolar and adipose tissue b) areolar and dense regular tissue c) areolar and dense irregular tissue d) areolar & chondrin
- Q.16 Which of the following areas in India is hotspot of biodiversity ?
 a) Eastern ghats b) Gangetic plain c) Sundarbans d) Western ghats
- Q.17 What is the criterion for DNA fragment movement on agarose gel during gel electrophoresis
 a) the smaller the fragment size, the faster it moves b) positively charged fragments move to farther end c) negatively charged particles do not move d) the larger the size, the farther it moves
- Q.18 Sacral plexus is formed by the joining of nerve networks of
 a) L₄L₅ and S₁S₂S₃ nerves b) 1st to 4th cervical nerves c) 5th to 8th cervical and 1st thoracic nerves d) 4th and 5th sacral and coccygeal nerves
- Q.19 In a standard ECG, each peak is identified with letters / alphabets P to T. QRS wave represents



Diagrammatic presentation of a standard ECG

- a) depolarisation of the atria b) repolarisation of ventricles c) depolarisation of ventricles d) excitation of the atria
- Q. 20 The haploid content of human DNA is
 a) 3.3×10^9 bp b) 1.65×10^9 bp c) 6.6×10^9 bp d) 3.3×10^9 Kbp
- Q. 21 The function of leghaemoglobin in the root nodules of legumes is
 a) inhibition of nitrogenase activity b) oxygen removed c) nodule differentiation d) expression of nif gene
- Q. 22 Antivenom injection contains preformed antibodies while polio drops that are given into the body contain
 a) harvested antibodies b) gamma globin c) attenuated pathogens d) activated pathogens
- Q. 23 Which one of the following animal is correctly matched with its particular taxonomic category
 a) Tiger Species-tigris b) Cuttle fish Class-Mollusca c) Humans Family-primata d) House fly Order-musca
- Q. 24 The first gene therapy was given for treating
 a) diabetes mellitus b) chicken pox c) rheumatoid arthritis d) adenosine deaminase deficiency
- Q. 25 Photosensitive compound in human eyes is made up of
 a) opsin and retinol b) opsin and retinal c) transducin and retinene d) guanosine and retinol
- Q. 26 The enzyme that is not found in C₃ plant is
 a) RuBP carboxylase b) PEP carboxylase c) NADP reductase d) ATP synthetase
- Q.27 Alexander von Humboldt described for the first time
 a) loss of limiting factor b) species area relationship c) population growth equation d) ecological diversity

- Q. 28 Primary oocyte within the tertiary follicle
 a) grows in size and divides and mitotically forms secondary oocyte b) grows in size and completes first meiotic division c) simply grows in size no division takes place d) grows in size and regresses
- Q. 29 Initial amount of DNA denoted as $2c$ increases to $4c$ in one of the phases of cell cycle
 a) G_0 & G_1 b) G_1 & S c) Only S d) Only G_1
- Q. 30 The hormone that influences metabolism, menstrual cycle and diurnal rhythm of our body is
 a) adrenalin b) oxytocin c) thymosin d) melatonin
- Q. 31 Administering anti-Rh antibodies to Rh-ve mother immediately after delivery of first child is to
 a) sensitise the mother b) stimulate B-lymphocytes c) destroy the Rh antibodies d) desensitise the mother
- Q. 32 Microbes that can be utilized for production of food supplements for human is
 a) nostoc b) acetabularia c) spirulina d) oscillatoria
- Q. 33 The organ that acts as both primary and secondary lymphoid organ is
 a) Red bone marrow b) Kidney c) Spleen d) Thymus
- Q.34 The gestation period in human has
 a) 3 trimesters b) 2 trimesters c) 5 trimesters d) 4 trimesters
- Q. 35 The maximum distance between the objects that reveals them as separate entities can be given by the
 a) abbe equation b) retraction minimum c) optical density d) par focal
- Q. 36 The segment of chromosome with centromere, if included in the inversion segment is called as
 a) paracentric mutation b) mutagenic segment mutation c) pericentric mutation d) tandem mutation
- Q. 37 A part of proinsulin that is absent in fully mature insulin is
 a) A chain b) B chain c) C Peptide d) S chain
- Q. 38 Cycas is a gymnosperm because it
 a) bears pollen grains b) possess vascular tissues c) possess cones and naked ovules d) grows in dry region
- Q. 39 The short stretches of DNA each primed by RNA are called
 a) replication fork b) lassing strand c) okazaki fragment d) single stranded primer
- Q. 40 Central dogma of molecular biology was described by Crick in 1953, but it was modified in 1970 due to new discovery. What is it? Who discovered it?
 a) transcriptase by Dalton b) reverse transcriptase by H M Temin c) unidirectional transcription by Smith d) reverse transcriptase by Marshall
- Q. 41 A multicarpellary apocarpous gynoecium is present in
 a) papaver b) hibiscus c) michelia d) petunia
- Q. 42 If vasopressin secretion is high from pituitary, then the urine excreted will be
 a) highly dilute urine and BP will increase b) highly concentrated urine & BP will fall c) highly concentrated urine & BP will increase d) highly dilute urine and BP will fall

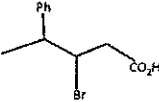

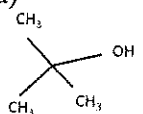
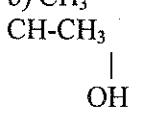
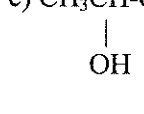
- Q. 43 In a rice field the organisms that help to increase the yield of crop is
 a) *Bacillus subtilis* b) *Anabena* c) *Sesbania* d) *Bacillus poilliae*
- Q. 44 Resting potential of a nerve fiber is
 a) +50 mV b) +70 mV c) -50 mV d) -70 mV
- Q. 45 Correct animal to order pair is
 a) cockroach - crustacea b) apple snail - pelecypoda c) spider - arachnida d) fresh water mussel - gastropoda
- Q. 46 During muscle contraction following changes are seen in a sarcomere
 a) 'I' band length gets increased, Z membranes are brought closure, whereas 'A' band retain its length
 b) 'I' band length remains same, Z membranes are moved apart, whereas 'A' band length gets reduced
 c) 'I' band length gets reduced, Z membranes are brought closure, whereas 'A' band length gets reduced
 d) 'I' band length gets reduced. Z membranes are brought closure, whereas 'A' band retain their length
- Q. 47 In Malignant tumor, neoplastic cells show characteristics like
 a) contact inhibition and metastasis
 b) loss of contact inhibition and metastasis
 c) loss of contact inhibition and metastasis
 d) slow down in cell division and metastasis
- Q. 48 The ribs are of three types based on their attachment to vertebrae dorsally and sternum ventrally. They are
 a) 9th & 10th are false ribs 11th & 12th are floating ribs
 b) 8th to 10th are false ribs 11th & 12th are floating ribs
 c) 9th & 10th are floating ribs 11th & 12th are false ribs
 d) 8th to 10th are floating ribs 11th to 12th are false ribs
- Q. 49 VNTR's belongs to a class of satellite DNA that is similar, specific and unique to
 a) single individual b) father and mother c) child and mother d) father & grand father
- Q. 50 Baculo viruses used as biological control agents are in the genus Nucleopolyhedrovirus. These viruses are excellent organisms for species specific narrow spectrum application of
 a) insecticidal b) predatory c) parasitic d) decomposer

CHEMISTRY

- Q. 51 In a flame test, strontium gives
 a) Blue colour b) Violet colour c) Yellow colour d) Crimson red colour
- Q. 52 Atoms with same atomic number but different atomic mass number are called
 a) Isotopes b) Isobars c) Isomers d) Isotones
- Q. 53 Which of the following is the valence electronic configuration of copper?
 a) $3d^9 4s^2$ b) $3d^8 4s^2$ c) $3p^6 3d^2 4s^2$ d) $3d^{10} 4s^1$
- Q. 54 How many unpaired electrons are there in Fe?
 a) 3 b) 4 c) 2 d) Zero
- Q. 55 Group 16 elements are called
 a) Halogens b) Noble gases c) Chalcogens d) Lanthanides

- Q. 56 What trend can you see in the atomic radii of elements when we go across a period from left to right?
 a) decreases b) increase c) remains same d) first increases and then decreases
- Q. 57 In the modern periodic table, the period indicates the value of _____.
 a) atomic number b) atomic Mass c) principal quantum number d) azimuthal quantum number
- Q. 58 Buna-S is an example of _____?
 a) copolymer b) homopolymer c) condensation polymer d) monomer
- Q. 59 Which of the following values represent Avogadro number?
 a) 6.022×10^{23} b) 6.022×10^{13} c) 6.022×10^{-23} d) 6.023×10^{-13}
- Q. 60 Which of the following is the most symmetrical crystal system?
 a) Triclinic b) Cubic c) Tetragonal d) Monoclinic
- Q. 61 Which is the co-ordination number of hcp structure?
 a) 12 b) 6 c) 4 d) 8
- Q. 62 Which stoichiometric defect in crystal increases the density of solid?
 a) Vacancy defect b) Frenkel Defect c) Schottky defect d) Interstitial defect
- Q. 63 Calculate molarity of a solution containing 6.5 g of NaOH in 550 ml solution
 a) 0.278 molL^{-1} b) 0.305 molL^{-1} c) 0.295 molL^{-1} d) 1.0 molL^{-1}
- Q. 64 Calculate the mass percentage of aspirin ($C_9H_8O_4$) in acetonitrile (CH_3CN) when 6.5 g of $C_9H_8O_4$ is dissolved in 450 g of CH_3CN
 a) 1.75% b) 1.237% c) 1.424% d) 1.64%
- Q. 65 Calculate the amount of KCl which must be added to 1kg of water so that the freezing point is depressed by 2K. (K_f for water = 1.86 K mol^{-1})
 a) 80.15 moles b) 90 moles c) 70.4 moles d) 40.05 moles
- Q. 66 Which of the following is **not** a method to prevent corrosion of iron?
 a) connecting with more active metals b) Sacrificial Protection c) using an electrolyte d) using alkaline phosphate solutions
- Q. 67 The reducing agent used in mercury cell is
 a) Carbon b) Zinc c) Mercury d) Nickel
- Q. 68 For which reaction, the reaction rate does not decrease with time?
 a) Zero order reaction b) First order reaction c) Pseudo first order reaction d) Second order reaction
- Q. 69 What is the half-life of a first order reaction whose rate constant is 200 s^{-1} .
 a) 0.346 min b) $3.46 \times 10^{-2} \text{ s}$ c) $3.46 \times 10^{-3} \text{ s}$ d) 0.346 s
- Q. 70 Which of the following is a characteristic of a catalyst?
 a) it initiates a reaction b) it's mass and composition changes during the reaction c) it affects the Gibbs energy of the reaction d) it accelerates the rate of chemical reaction
- Q. 71 Name the catalyst in Haber's process
 a) Sulphur b) Carbon Monoxide c) Nickel d) Iron oxide

- Q. 72 In a cinema hall, during the projection of the film on the screen, the path of light can be seen due to
 a) Colligative property b) Tyndall effect c) Electrical property d) Brownian movement
- Q. 73 Which of the following is the ore of aluminium?
 a) haematite b) fluorite c) bauxite d) malachite
- Q. 74 Calcination is the process in which the concentrated ore is _____
 a) heated to a high temperature in the absence of air b) heated to a high temperature in the presence of excess of air c) treated with certain reagents in which the ore is soluble d) ground to fine powder and mixed with water
- Q. 75 Which of the following is an acidic oxide?
 a) Sodium Oxide b) Sulphur dioxide c) Nitric Oxide d) Aluminium Oxide
- Q. 76 Why does NH_3 (Ammonia) form hydrogen bond but PH_3 (Phosphine) does not?
 a) because the electronegativity of Nitrogen and Hydrogen are same b) because the electronegativity of Phosphorus and Hydrogen are same c) because the electronegativity of Phosphorus is greater than Nitrogen d) because the electronegativity of Nitrogen is greater than Phosphorus
- Q. 77 The basic character of the hydrides of group 15 elements _____ down the group
 a) decreases b) increases c) remains same d) increases till Arsenic and then decreases
- Q. 78 Which of the following does not exhibit optical isomerism?
 a) $cis-[PtCl_2(en)_2]^{2+}$ b) $[Co(NH_3)_4Cl_2]^+$ c) $[Co(en)_3]^{3+}$ d) $cis-[CrCl_2(ox)_2]^{3-}$
- Q. 79 Cr^{3+} ion in octahedral field has following configuration
 a) $t_{2g}^2 e_g^1$ b) $t_{2g}^3 e_g^2$ c) $t_{2g}^3 e_g^0$ d) $t_{2g}^4 e_g^0$
- Q. 80 Which of the following is paramagnetic?
 a) O_2 b) Li_2 c) H_2 d) N_2
- Q. 81 Which one is **not** a constituent of DNA?
 a) Adenine b) Guanine c) Uracil d) Cytosine
- Q. 82 Isopropyl methyl ether when treated with cold HI gives?
 a) Isopropyl alcohol and methyl iodide b) Isopropyl iodide and methyl iodide c) Isopropyl alcohol and methyl alcohol d) Isopropyl iodide and methyl alcohol
- Q. 83 Name the reaction when sodium phenoxide is heated with carbon dioxide at 400K under 4 – 7 atm to give salicylic acid.
 a) Reimer-Tiemann reaction b) Kolbe's reaction c) Rosenmundsreary d) Hoffmann bromamide reaction
- Q. 84 Benzaldehyde and acetone can be distinguished by using _____
 a) 2, 4 – DNP b) Tollen's reagent c) Hydrazine d) Sodium hydroxide solution

- Q. 85 Write IUPAC names for the following compound $[\text{Co}(\text{NH}_3)_5\text{Cl}]\text{Cl}_2$
- a) pentammine cobalt (III) chloride b) pentammine chlorocobalt (III) chloride c) cobalt pent ammine (III) chloride d) cobalt pentammine chloro (III) chloride
- Q. 86 Bromomethane, Bromoform, Chloromethane and Dibromomethane can be arranged in the increasing order of their boiling point as
- a) Chloromethane < Bromomethane < Dibromomethane < Bromoform
 b) Bromomethane < Bromoform < Chloromethane < Dibromomethane
 c) Dibromomethane < Chloromethane < Bromomethane < Bromoform
 d) Bromoform < Bromomethane < Dibromomethane < Chloromethane
- Q. 87 Tertiary alkyl halide prefer to undergo _____ mechanism
- a) S_N2 b) E^1 c) S_N1 d) E^2
- Q. 88 Give IUPAC name for the following compound
- 
- a) 4-phenyl-3-bromopentanoic acid b) 2-phenyl-3-bromopentanoic acid c) 3-Bromo-2-phenylpentanoic acid d) 3-Bromo-4-phenylpentanoic acid
- Q. 89 An organic compound containing C, H and N gave the following analysis C= 40% H= 13.33% and N=46.67%. What would be its empirical formula?
- a) C_2H_7N b) $C_2H_7N_2$ c) CH_4N d) CH_5N
- Q. 90 The treatment of CH_3MgBr with $\text{CH}_3\text{C}-\text{CH}_3$, followed by the addition of water gives
- 
- a)  b)  c)  d) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_3$
- Q. 91 Glucose and fructose are
- a) Chain Isomers b) Position Isomers c) Functional Isomers d) Optical Isomers
- Q. 92 XeOF_4 has _____ geometry
- a) pyramidal b) distorted octahedral c) tetrahedral d) square pyramidal
- Q. 93 Which of the following elements is not actually a transition element but is placed with them?
- a) Zn b) Ti c) Ni d) Zr
- Q. 94 $[\text{Co}(\text{NH}_3)_5\text{SO}_4]\text{Br}$ and $[\text{Co}(\text{NH}_3)_5\text{Br}]\text{SO}_4$ are examples of _____ isomers.
- a) linkage b) ionisation c) coordination d) solvate
- Q. 95 Which is the major product formed when propene reacts with HCl in presence of peroxide?
- a) Propane b) 2-chloropropane c) 1,2-dichloropropane d) 1-chloropropane

Q. 96

Which of the following reactants would you prefer for producing $\text{CH}_3-\overset{\text{CH}_3}{\underset{\text{CH}_3}{\text{C}}}-\text{OC}_2\text{H}_5$

- a) $\text{C}_2\text{H}_5\text{ONa} + (\text{H}_3\text{C})_3\text{CCl}$ b) $\text{C}_2\text{H}_5\text{Cl} + (\text{CH}_3)_3\text{CONa}$ c) $\text{C}_2\text{H}_5\text{CO}_2\text{H} + (\text{CH}_3)_3\text{CONa}$ d) $\text{C}_2\text{H}_5\text{ONa} + (\text{CH}_3)_3\text{CHO}$

Q. 97

Ozone has _____
 a) Two pi-bonds and two σ -bonds b) Two σ -bonds and one pi-bond c) Two pi-bonds and one σ -bond d) Three σ -bonds only

Q. 98

For the reaction $2 \text{Cl}(\text{g}) \longrightarrow \text{Cl}_2(\text{g})$, what are the signs of ΔH and ΔS , respectively?
 a) positive & positive b) positive & negative c) negative & positive d) negative & negative

Q. 99

Surface tension vanishes at _____
 a) melting point b) critical temperature c) condensation point d) triple point

Q. 100

Which of the following compound can form zwitterion?
 a) Amino acid b) Aniline c) Benzoic acid d) Acetanilide

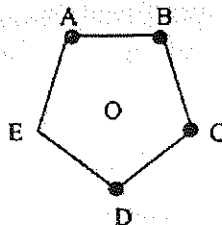
PHYSICS

Q. 101

The SI unit of permittivity of free space (ϵ_0) is,
 a) C^2Nm^{-2} b) $\text{C}^2\text{N}^{-1}\text{m}^{-2}$ c) C^{-2}Nm^2 d) $\text{C}^2\text{N}^{-1}\text{m}^{-2}$

Q. 102

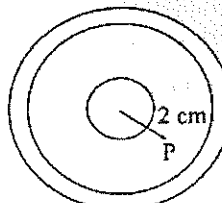
Four particles each having a charge q , are placed on the four vertices of a regular pentagon. The distance of each corner from the centre is a . Find the electric field at the centre of the pentagon.



- a) $\frac{q}{4\pi\epsilon_0 a^2}$ along OE b) $\frac{q}{2\pi\epsilon_0 a^2}$ along OE c) $\frac{3q}{4\pi\epsilon_0 a^2}$ along OE d) $\frac{q}{\pi\epsilon_0 a^2}$ along OE

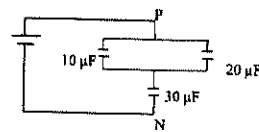
Q. 103

A charge of $4 \times 10^{-8} \text{ C}$ is distributed uniformly on the surface of a sphere of radius 1 cm. It is covered by a concentric hollow conducting sphere of radius 5 cm and a total charge of $6 \times 10^{-8} \text{ C}$. Find the electric field at the point P. (Which is 2 cm away from the centre)



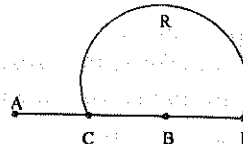
- a) $9 \times 10^9 \text{ N/C}$ b) $9 \times 10^4 \text{ N/C}$ c) $9 \times 10^5 \text{ N/C}$ d) $9 \times 10^6 \text{ N/C}$

Q. 104 Find the equivalent capacitance between the points P and N



- a) $50 \mu\text{F}$ b) $\frac{110}{3} \mu\text{F}$ c) $\frac{60}{11} \mu\text{F}$ d) $15 \mu\text{F}$

Q. 105 Charges $+q$ and $-q$ are placed at points A and B respectively which are at a distance of $2L$ apart, C is the midpoint of AB. The work done in moving a charge $+Q$ along a semicircle CRD is,



- a) $\frac{-qQ}{6\pi\epsilon_0 L}$ b) $\frac{qQ}{6\pi\epsilon_0 L}$ c) $\frac{qQ}{2\pi\epsilon_0 L}$ d) $\frac{-qQ}{2\pi\epsilon_0 L}$

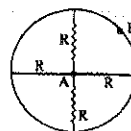
Q. 106 The energy density in the electric field created by a point charge falls off with the distance from the charge as,

- a) $\frac{1}{r}$ b) $\frac{1}{r^2}$ c) $\frac{1}{r^4}$ d) $\frac{1}{r^3}$

Q. 107 Potentiometer is better than voltmeter in measuring emf of a cell because,

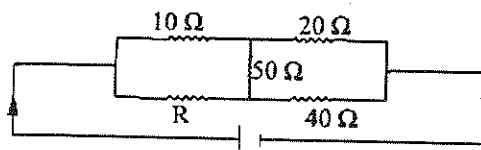
- a) dial of the voltmeter is smaller than potentiometer b) potentiometer does not draw any current from the source c) resistance of potentiometer wire is high d) this is an economical method

Q. 108 What is the equivalent resistance between A and B?



- a) $\frac{R}{2}$ b) $4R$ c) $2R$ d) $\frac{R}{4}$

Q. 109 Find the value of R in figure below so that there is no current in the 50Ω resistor



- a) 20Ω b) 10Ω c) 40Ω d) 80Ω

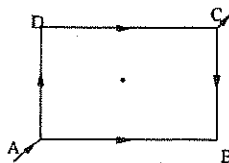
Q.110 The power of two electric bulbs are 100 W and 200 W . Both of them are joined with 220 V mains. The ratio of the resistance of the filaments would be,

- a) 1:4 b) 1:2 c) 2:1 d) 4:1

Q. 111 An ammeter consists of a 480Ω coil connected in parallel to a 20Ω shunt. This ammeter is used to measure the current through a circuit consisting of a resistor of 140.8Ω connected to a source of 20 V . What would be the reading of the ammeter?

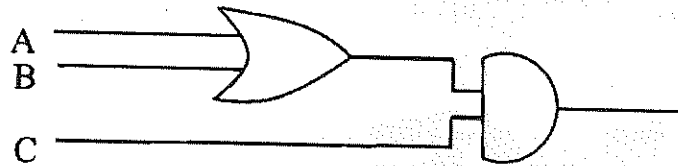
- a) 0.04 A b) 0.125 A c) 0.4 A d) 0.0125 A

- Q. 112 In the figure given below, a current of 1A flows in at A. ABCD is a square loop made of uniform wire of side 20 cm. Find the magnetic field at the centre of the square loop.



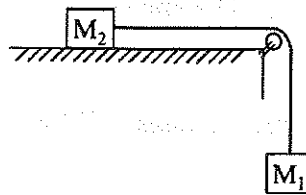
- a) 1.1×10^{-7} T b) 2.2×10^{-7} T c) 1.25×10^{-7} T d) zero
- Q. 113 A charged particle of charge $6 \mu\text{C}$ is moving with a speed of 20 m/s along a magnetic field line of 2 T. The magnetic force on the particle is,
a) Zero b) 2.4×10^{-4} N c) 1.2×10^{-4} N d) 1.8×10^{-4} N
- Q. 114 A conducting circular loop is placed in a uniform magnetic field $B = 0.01\text{T}$ with its plane perpendicular to the field. Somehow, the radius of the loop starts shrinking at a constant rate of 10^{-4} m/s. Find the induced emf in the loop at an instant when the radius is 2 cm.
a) $0.25 \mu\text{V}$ b) $0.025 \mu\text{V}$ c) $0.0126 \mu\text{V}$ d) $0.126 \mu\text{V}$
- Q. 115 An alternating voltage $200 \sin(100t)$ is applied to a series combination of a resistance of 30Ω and an inductor of 400 mH. The power factor of the circuit is,
a) 0.06 b) 0.2 c) 0.6 d) 0.02
- Q. 116 An LCR series circuit with $L = 100$ mH, $C = 100 \mu\text{F}$ and $R = 120 \Omega$ is connected to an ac source of emf of $30 \sin(100t)$. Find the resonant frequency of the circuit (approximately).
a) 5 Hz b) 50 Hz c) 25 Hz d) 12.5 Hz
- Q. 117 Dimensions of $\frac{1}{(\mu_0 \epsilon_0)}$ is
a) $[\text{M}^0 \text{L}^{-2} \text{T}^{+2}]$ b) $[\text{M}^0 \text{L}^{-2} \text{T}^{-2}]$ c) $[\text{M}^0 \text{L} \text{T}^{-2}]$ d) $[\text{M}^0 \text{L}^2 \text{T}^{-2}]$
- Q. 118 A star emits yellow light. If it starts accelerating towards earth, what change in colour of the emitted light would be observed by a person on the earth?
a) it gradually turns blue b) it gradually turns red c) it suddenly turns blue d) it suddenly turns red
- Q. 119 A small bulb is placed at the bottom of a tank containing water (refractive index = 1.33) to a depth of 50 cm. What is the area of the surface of water through which light from the bulb can emerge out?
a) 0.6 m^2 b) 0.06 m^2 c) 1.02 m^2 d) 0.102 m^2
- Q. 120 A nearsighted man can clearly see objects up to a distance of 1.3333 m. What should be the power of the lens of the spectacles which he should use?
a) 0.3333 D b) -0.75 D c) 0.75 D d) -0.3333 D
- Q. 121 A light of intensity I_0 falls on a polaroid P_1 . The transmitted light is passed through another polaroid P_2 . The pass axis of P_1 and P_2 make an angle of $\frac{\pi}{4}$. The transmitted light intensity is,
a) $\frac{I_0}{2}$ b) $\frac{I_0}{\sqrt{2}}$ c) $\frac{\sqrt{3}}{2} I_0$ d) $\frac{3I_0}{4}$
- Q. 122 Planck constant has the same dimension as,
a) force \times time b) force \times distance c) force \times speed d) force \times distance \times time
- Q. 123 A beam of 450 nm light is incident on a metal having a work function of 2.0 eV and placed in a magnetic field B . The most energetic electrons emitted perpendicular to the field are bent in circular arcs of radius 20cm. What is the value of B ?
a) 1.46×10^{-4} T b) 2.92×10^{-5} T c) 1.46×10^{-5} T d) 2.92×10^{-4} T

- Q. 124 What is the approximate wavelength of the radiation required to excite the electron in Li^{++} from the first to the third Bohr orbit?
 a) 114 nm b) 11.4 nm c) 228 nm d) 22.8 nm
- Q. 125 As we consider orbits with higher values of n in a hydrogen atom, the electric potential energy of the atom
 a) decreases b) increases c) remains the same d) cannot increase
- Q. 126 The mass number of a nucleus is
 a) more than the atomic number b) equal to the atomic number c) more than or equal to the atomic number d) less than the atomic number
- Q. 127 A radioactive sample has 8.0×10^{24} active nuclei at a certain instant. How many of these nuclei will still be in the same active state after four half lives?
 a) 2×10^{23} b) 5×10^{24} c) 5×10^{23} d) 2×10^{24}
- Q. 128 To get an output 1 from the circuit shown below, the input must be,

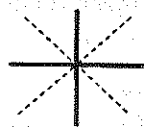


- a) $A = 1, B = 0, C = 1$ b) $A=0, B = 1, C = 0$ c) $A=1, B = 0, C = 0$ d) $A = 1, B = 1, C = 0$
- Q. 129 For a transistor in common emitter configuration, the current amplification factor is 4. If the change in base current is 6 mA, what is the change in the collector current?
 a) 2.4 mA b) 3.6 mA c) 36 mA d) 24 mA
- Q. 130 A message signal of frequency 10 kHz and peak voltage of 10 V is used to modulate a carrier of frequency 1 MHz and peak voltage of 20 V, what would be the modulation index?
 a) 0.05 b) 0.2 c) 0.02 d) 0.5
- Q. 131 Find the relative error in Z , if $Z = \frac{A^2 B^{1/4}}{C^3 D^{2/3}}$ and $A, B, C,$ and D each have a relative error of 0.1
 a) 0.592 b) 0.0592 c) 0.296 d) 0.0296
- Q. 132 A ball is thrown from a field with a speed of 12.0 m/s at an angle of 45° with the horizontal. At what distance will it hit the field again? (Take $g = 10.0 \text{ m/s}^2$)
 a) 7.2 m b) 144 m c) 14.4 m d) 72 m
- Q. 133 The value of the distance travelled by a particle in time t is given by $s = 2.5 t^2$. What is the average speed of the particle during the time 0 to 5 seconds?
 a) 1.25 m/s b) 12.5 m/s c) 25 m/s d) 2.5 m/s
- Q. 134 Two bodies are dropped from different heights h_1 and h_2 . The ratio of time taken by them to reach ground will be
 a) $h_1 : h_2$ b) $\frac{1}{\sqrt{h_1}} : \frac{1}{\sqrt{h_2}}$ c) $h_1^2 : h_2^2$ d) $\sqrt{h_1} : \sqrt{h_2}$

- Q. 135 In the diagram given below, $M_1 = 5$ kg and $M_2 = 2$ kg. What would be the acceleration of the system? (Neglect friction) (Take $g = 10$ m/s²)



- a) $\frac{50}{7}$ ms⁻² b) $\frac{20}{7}$ ms⁻² c) $\frac{70}{5}$ ms⁻² d) $\frac{70}{2}$ ms⁻²
- Q. 136 The force on a particle of mass 10 g is $(10\hat{i} + 5\hat{j})$ N. If it starts from rest what would be its position at time $t = 5$ s?
- a) $(12.5\hat{i} + 62.5\hat{j})$ m b) $(12.5\hat{i} + 625\hat{j})$ m c) $(12500\hat{i} + 6250\hat{j})$ m d) $(125000\hat{i} + 62500\hat{j})$ m
- Q. 137 A pendulum of time period T is kept suspended in a train accelerating uniformly. The time period would
- a) increase b) decrease c) remain the same d) not be predicted as data is insufficient
- Q. 138 A body of mass ' m ' is dropped from a height H reaches the ground with a speed of $1.2\sqrt{gH}$. What is the work done by air friction?
- a) $-0.28 mgH$ b) $0.28 mgH$ c) $-0.72 mgH$ d) $0.72 mgH$
- Q. 139 The two blocks in an Atwoods machine have masses 2.0 kg and 3.0 kg. Find the work done by gravity during the fourth second after the system is released from rest (take $g = 10$ m/s²)
- a) 90 J b) 350 J c) 35 J d) 70 J
- Q. 140 The work done on an object is equal to the change in
- a) speed b) acceleration c) kinetic energy d) momentum
- Q. 141 The density of a linear rod PQ of length 1 m varies as $P = 1.0 + 0.5x$ where x is the distance from the end P. What would be the distance of the centre of mass from the end P?
- a) 0.467 m b) 0.533 m c) 0.333 m d) 0.667 m
- Q. 142 Two uniform identical rods of each of mass (M) and length (l) are joined to form a cross as shown below. Find the moment of inertia of the cross about a bisector as shown dotted in the figure given below.



- a) $\frac{Ml^2}{6}$ b) $\frac{Ml^2}{4}$ c) $\frac{Ml^2}{8}$ d) $\frac{Ml^2}{12}$
- Q. 143 The gravitational field due to a mass distribution is given by $E = \frac{10.0}{x^{3/2}}$ units in the X - direction. Taking the gravitational potential to be zero at infinity, find its value at $x = 0.5$ units
- a) 84.8 units b) 8.48 units c) 848 units d) 0.848 units
- Q. 144 Two wires A and B are of the same material. Their length is in the ratio 1:2 and diameter is in the ratio 2:1. When stretched by forces F_A and F_B respectively, the wires A and B get equal elongations. The ratio of F_A to F_B is,
- a) 1:4 b) 4:1 c) 8:1 d) 1:8

- Q. 145 The cross sectional area A_0 of the aorta (a major blood vessel) of a normal resting person is 3 cm^2 and the speed V_0 of the blood through it is 30 cm/s . A typical capillary (diameter $\approx 6 \text{ }\mu\text{m}$) has a cross sectional area A of $3 \times 10^{-7} \text{ cm}^2$ and a flow speed V of 0.05 cm/s . How many capillaries does such a person have?
 a) 6×10^8 b) 6×10^9 c) 3×10^9 d) 3×10^8
- Q. 146 A pendulum clock having a copper rod keeps correct time at 20°C . It gains 15 seconds per day if cooled to 0°C . The variation in time is given by $T = T_0(1 + \frac{1}{2}\alpha\theta)$ where T_0 = time period at 0°C , α = coefficient linear expansion of copper, and θ = change in temperature. What would be the coefficient of linear expansion of copper?
 a) $1.7 \times 10^{-5} \text{ }^\circ\text{C}^{-1}$ b) $1.7 \times 10^{-6} \text{ }^\circ\text{C}^{-1}$ c) $1.7 \times 10^{-3} \text{ }^\circ\text{C}^{-1}$ d) $1.7 \times 10^{-4} \text{ }^\circ\text{C}^{-1}$
- Q. 147 A steam engine intakes 100 g of steam at 100°C per minute and cools it down to 20° . What would be the heat rejected by the steam engine per minute? Latent heat of vaporization of steam is 540 cal/g .
 a) $0.8 \times 10^4 \text{ cal}$ b) $5.4 \times 10^4 \text{ cal}$ c) $4.6 \times 10^4 \text{ cal}$ d) $6.2 \times 10^4 \text{ cal}$
- Q. 148 The acceleration (a) and the displacement (x) of a particle executing a simple harmonic motion are related as, (ω^2 is a constant)
 a) $a = -\omega x$ b) $a = +\omega^2 x$ c) $a = -\omega^2 x$ d) $a = +\omega x$
- Q. 149 A uniform meter stick is suspended through a small pinhole at the 10 cm mark. The time period of small oscillation about the point of suspension would be, (take $g = 10 \text{ m/s}^2$)
 a) 1.55 s b) 1.62 s c) 1.43 s d) 1.71 s
- Q. 150 A guitar string is 90 cm long and has a fundamental frequency of 124 Hz . Where should it be pressed to produce a fundamental frequency of 186 Hz ?
 a) 50 cm from an end b) 60 cm from an end c) 45 cm from an end d) 35 cm from an end