Q. B. Series: **A**

Q. B. Number: **600329**

CET FOR B.E. / B. TECH. (ENGINEERING COURSES) - 2024

QUESTION BOOKLET

INSTRUCTIONS

Maximum Time Allowed: 3 Hours
Negative Marking: 0.25 Marks

No. of Questions: 180
Maximum Marks :180

Roll Number: _____ **Answer Sheet Number:** _____

1) **Check the Booklet thoroughly**: In case of any defect Misprint, Missing question(s), Missing page, Blank page, Damaged or Defaced page, or duplication of question(s) / Page(s), get the Booklet changed with the Booklet of the same series from the Room Invigilator. No complaint shall be entertained after the Entrance Test is over.

2) Write your Roll Number and the OMR Answer Sheet Number on the Question Booklet.

3) Mark carefully your Roll Number, Question Booklet Number and Question Booklet Series on the OMR Answer Sheet and sign at the appropriate place. Candidates shall be personally responsible for any mistake committed in making these entries in the OMR Answer Sheet. Board shall under no circumstances be responsible for any such mistake.

4) Strictly follow the instructions given by the Centre Supervisor / Room Invigilator and those given on the Question Booklet.

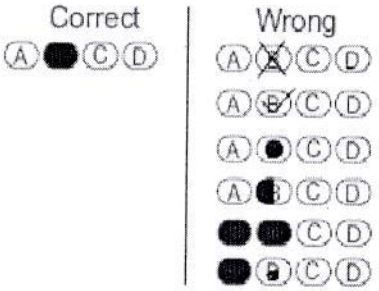
5) Candidates are not allowed to carry any papers, notes, books, calculators, cellular phones, scanning devices, pagers etc. to the Examination Hall. Any candidate found using, or in possession of, such unauthorized material or indulging in copying or impersonation or adopting unfair means / reporting late / without Admit Card will be debarred from the Entrance Test.

6) Please mark the right responses on the OMR Sheet with ONLY a Blue/Black ball point pen. Use of eraser, whitener (fluid) and cutting on the OMR Answer Sheet is NOT allowed.

7) The test is of objective type, containing multiple choice questions (MCQs). Each objective question is followed by four responses. You are required to choose the correct/best response and mark your response on the OMR Answer Sheet and NOT on the Question Booklet.

8) There will be negative marking of 0.25 marks for every wrong answer.

9) For marking response to a question, completely darken the CIRCLE so that the alphabet inside the CIRCLE is not visible. Darken only ONE circle for each question. If you darken more than one circle, it will be treated as a wrong answer. The CORRECT and the WRONG method of darkening the CIRCLE on the OMR Answer Sheet are shown below.



10) Please be careful while marking the response to questions. The response once marked cannot be changed and if done shall be treated as a wrong answer.

11) In view of the limited time, do NOT waste your time on a question which you find difficult during the test.

12) DO NOT make any stray or faint mark anywhere in or around the oval on the OMR Answer Sheet. It will be read as double shading and will make answer invalid. DO NOT fold or wrinkle the OMR Answer Sheet.

13) Rough work MUST NOT be done on the OMR Answer Sheet. Use rough page of your Question Booklet for this purpose.

14) Candidates are provided carbonless OMR Answer Sheet, having original copy and candidate's copy. After completing the examination, candidates are directed to fold at perforation on the top of the sheet, tear it to separate original copy and candidate's copy and then hand over the original copy of OMR Answer Sheet to the Room Invigilator and retain candidate's copy.

SEAL

DO NOT OPEN THE SEAL OF THIS BOOKLET UNTIL TOLD TO DO SO

PHYSICS (Q1 TO Q60)

Q1. What is the unit of measurement of solid angles?
(a) Steradian (b) Degrees
(c) Radians (d) Grades

Q2. If the unit of force and length are doubled, the unit of energy will be
(a) 1/2 times (b) 2 times
(c) 4 times (d) 1/4 times

Q3. A particle is moving with a constant speed along a straight-line path. A force is not required to
(a) change its direction
(b) decrease its speed
(c) keep it moving with uniform velocity
(d) Increase its momentum

Q4. A ball tied at the end of a perfect string tied tightly (assume fixed) to a wooden bar at the other end is rotating with constant angular velocity. Its tangential velocity will _____
(a) Increase with time
(b) Decrease with time
(c) Will remain constant
(d) Will decrease exponentially

Q5. What may the cross product of two vectors be used for?
(a) area of rectangle
(b) area of square
(c) area of parallelogram
(d) perimeter of rectangle

Q6. The inherent property, with which a body resists any change in its state of motion is known as _____
(a) Force (b) Momentum
(c) Inertia (d) Acceleration

Q7. A bus that is travelling straight makes an abrupt right turn. What will happen to those who are on board the bus?
(a) they will lean rightwards
(b) they will lean leftwards
(c) they will remain stationary
(d) they will begin jumping

Q8. You lift a heavy book from the floor of the room and keep it in the bookshelf having a height of 2m. This process takes 5 seconds. The work done by you will depend on
(a) Mass of the book and the time taken
(b) Weight of the book and height of the bookshelf
(c) Height of the bookshelf and the time taken
(d) Mass of the book, height of the bookshelf and the time taken

Q9. Energy a system possesses because of the force exerted on its mass by a gravitational or electromagnetic field with respect to a reference surface.
(a) Kinetic Energy
(b) Potential Energy
(c) Work
(d) None of the mentioned

Q10. A boy of mass 50kg is standing on a frictionless surface. He throws a ball of mass 2kg away from him with a speed of 10m/s. Find the final speed of the centre of mass.
(a) 0m/s (b) 20m/s
(c) 10m/s (d) 0.4m/s

Q11. Point, where the total volume of the body is assumed to be concentrated is _____
(a) Center of area
(b) Centroid of volume
(c) Centroid of mass
(d) All of the mentioned

Q12. The displacement of the body is given to be proportional to the cube of time elapsed. The magnitude of acceleration of body is _____
(a) Increasing with time
(b) Decreasing with time
(c) Constant but not zero
(d) Zero

Q13. If the earth loses its gravity, then for a body___
(a) Weight becomes zero
(b) Mass becomes zero
(c) Neither mass nor weight is zero
(d) Both mass and weight are zero

Q14. The law which states that within elastic limits strain produced is proportional to the stress producing it is known as _____
(a) Bernoulli's law (b) Hooke's law
(c) Stress law (d) Poisson's law

Q15. The slope of the stress-strain curve in the elastic deformation region is _____
(a) Elastic modulus
(b) Plastic modulus
(c) Poisson's ratio
(d) None of the mentioned

Q16. Hess's law states that a chemical reaction is independent of the route by which chemical reactions takes place while keeping the same
(a) initial conditions only
(b) final conditions only
(c) mid-conditions
(d) initial and final conditions

Q17. Select the correct order of steps in which a working substance(gas) goes through in a refrigerator.
(a) Expansion of gas, absorption of heat, heating of vapour, release of heat
(b) Absorption of heat, expansion of gas, heating of vapour, release of heat
(c) Heating of vapour, expansion of gas, absorption of heat, release of heat
(d) Heating of vapour, absorption of heat, expansion of gas, release of heat

Q18. Which of the following is not a gas law?
(a) Boyle's law (b) Charles law
(c) Hooks law (d) Gay Lussac's law

Q19. The equation pv=RT is used for ideal gases. The right equation for real gases is van der Waals equation. What is the correct formula for the van der Waals equation?
Where (a/v^2) = *force of cohesion*
b = *coefficient related to volume of molecules*
(a) $(p+(a/v^2))\ (v + b) = RT$
(b) $(p - (a/v^2))\ (v - b) = RT$
(c) $(p + (a/v^2))\ (v - b) = RT$
(d) $(p - (a/v^2))\ (v + b) = RT$

Q20. Which of the following has a mole ratio 1:1?
(a) 7 g of N and 12 g of Na
(b) 20 g of Na and 20 g of Ca
(c) 14 g of N and 24 g of Mg
(d) 10 g of Ca and 6 g of C

Q21. What are the total degrees of freedom if the number of species are 8, total streams are 3, stream temperature 3, stream pressure 3 and heat released 1, extent of reaction 2?
(a) 8 (b) 12
(c) 15 (d) 17

Q22. **Statement:** The amplitude of an oscillating pendulum decreases gradually with time.
Reason: The frequency of the pendulum decreases with time.
(a) Both statement and reason are true and the reason is the correct explanation of the statement
(b) Both statement and reason are true but the reason is not the correct explanation of the statement
(c) Statement is true, but the reason is false
(d) Statement and reason are false

Q23. A particle is initially at the centre and going towards the left. Let T be the time period of the SHM it is undergoing. What will be its position and velocity at time 3T/4, if it starts from the centre at t=0?

(a) At right extreme, zero velocity
(b) at centre, maximum speed towards left
(c) at centre, maximum speed towards right
(d) Mid-way between centre and -A

Q24. What is meant by mean free path?
(a) It is the average distance a molecule travels without colliding
(b) Average distance between 2 molecules
(c) Average distance travelled by a molecule before colliding with a wall of the container
(d) Sum of distance travelled by all molecules

Q25. The property which differentiates two kinds of charges is called _____.
(a) Equality of charge (b) Polarity of charge
(c) Fraction of charge (d) None of the option

Q26. What happens when a glass rod is rubbed with silk?
(a) gains protons from silk
(b) gains electrons from silk
(c) gives electrons to silk
(d) gives protons to silk

Q27. Two charges Q1 and –Q2 are separated by a distance r. The charges attract each other with a force F. What is the new force between the charges if the distance is cut to one-fourth and the magnitude of each charge is doubled?
(a) 16 F (b) 64 F
(c) 48 F (d) 1/ 48 F

Q28. X' is a substance which does not allow the flow of charges through it but permits them to exert electrostatic forces on one another through it. Identify X.
(a) Polar molecule (b) Dielectric
(c) Non-polar molecule (d) Equipotential

Q29. The opposition offered by the electrolyte of the cell to the flow of current through itself is known as _____.
(a)External resistance
(b)Internal resistance
(c)Non-resistance
(d)None of these options

Q30. A steady current flows in a metallic conductor of non-uniform cross-section. Which of the following quantities is constant along the conductor?
(a) Drift Speed (b) Current
(c) Current Density (d) None of these

Q31. Resistor Color codes were developed by:
(a) Radio Manufacturers Association (RMA)
(b) International Organization for Standardization (ISO)
(c) Electronics Industries Alliance (EIA)
(d) a & b are correct

Q32. 36 cells, each of emf 4V are connected in series and kept in a box. The combination shows an emf of 88V on the outside. Calculate the number of cells reversed.
(a) 2 (b) 5
(c) 10 (d) 7

Q33. If a coil carrying current is placed in a uniform magnetic field, then
(a) emf is produced
(b) Torque is produced
(c) Force is produced
(d) Torque and force is produced

Q34. If the current I flows through the coil of radius r then the field at the centre of the circular coil is
(a) Inversely proportional to I^2
(b) Directly proportional to I
(b) Directly proportional to r
(d) Inversely proportional to r^2

Q35. Which among the following is denoted by δ?
(a) Horizontal component
(b) Magnetic meridian
(c) Magnetic declination
(d) Magnetic inclination

Q36. How is a galvanometer converted into an ammeter?
(a) By connecting a high resistance shunt in parallel to the galvanometer
(b) By connecting a low resistance shunt in parallel to the galvanometer
(c) By connecting a high resistance shunt in series with the galvanometer
(d) By connecting a low resistance shunt in series with the galvanometer

Q37. A current-carrying rectangular coil placed in a uniform magnetic field. In which orientation will the coil rotate?
(a) In any orientation
(b) The magnetic field is parallel to the plane of the coil
(c) The magnetic field is at 45^0 with the plane of the coil
(d) The magnetic field is perpendicular to the plane

Q38. Which of the following factors is the self inductance associated with a coil is independent of?
(a) induced voltage (b) current
(c) time (d) coil resistance

Q39. Find the force due to a current element of length 2cm and flux density of 12 tesla. The current through the element will be 5A.
(a) 1 N (b) 1.2 N
(c) 1.4 N (d) 1.6 N

Q40. Which of the following statement is valid?
(a) Lenz's law is a consequence of the law of conservation of energy
(b) Lenz's law is a consequence of the law of conservation of momentum
(c) Lenz's law is a consequence of the law of conservation of force
(d) Lenz's law is a consequence of the law of conservation of mass

Q41. _____ the resonant frequency, the current in the capacitor leads the voltage in a series RLC circuit.
(a) Above
(b) Below
(c) Equal to
(d) Depends on the circuit

Q42. Which of the following can be used to produce a propagating electromagnetic wave?
(a) Charge moving at a constant speed
(b) Chargeless particle
(c) Stationary charge
(d) An accelerating charge

Q43. Which type of transmission line accepts the Transverse electromagnetic wave?
(a) Copper cables
(b) Coaxial cable
(c) Rectangular waveguides
(d) Circular waveguides

Q44. Which of the following cannot travel in vacuum?
(a) Radio waves (b) Gamma Waves
(c) Infrared Waves (d) Infrasonic waves

Q45. Which of the following is a necessary condition for total internal reflection?
(a) The angle of incidence in the denser medium must be greater than the critical angle for the two media
(b) The angle of incidence in the rarer medium must be greater than the critical angle for the two media
(c) The angle of incidence in the denser medium must be lesser than the critical angle for the two media
(d) The angle of reflection in the denser medium must be greater than the critical angle for the two media

Q46. Multimode graded index fibers are manufactured from materials with _____
(a) Lower purity
(b) Higher purity than multimode step index fibers.
(c) No impurity
(d) Impurity as same as multimode step index fibers.

Q47. A convex lens is dipped in a liquid whose refractive index is equal to the refractive index of the lens. Then what is its focal length?
(a) Focal Length will become zero
(b) Focal Length will become infinite
(c) Focal length will reduce, but not become zero
(d) Remains unchanged

Q48. If the separation between the two slits in Double Slit Fraunhofer Diffraction is changed, what change will be observed in the diffraction pattern?
(a) The fringe length will increase
(b) The fringe length will decrease
(c) Fringes will be colored
(d) No change

Q49. Which element of the light microscope is in charge of regulating the amount of light that enters the viewing area?
(a) Coarse adjustment screw
(b) Fine adjustment screw
(c) Diaphragm
(d) Condenser lens

Q50 . A convex lens of focal length f = 20 cm is combined with a diverging lens of power 65 D. The power and the focal length of the combination is
(a) –1.5 D, 66.7 cm (b) 1.5 D, 33.7 cm
(c) 5 D, 66.7 cm (d) 5 D, 33.6 cm

Q51. According to the thin lens formula, which one of the following is true regarding the focal length of the lens?
(a) f is positive for concave lens
(b) f is negative for convex lens
(c) f is positive for a diverging lens
(d) f is negative for concave lens

Q52. What happens to the kinetic energy of the emitted electrons when the light is incident on a metal surface?
(a) It varies with the frequency of light
(b) It varies with the light intensity
(c) It varies with the speed of light
(d) It varies irregularly

Q53. Which radiations will be most effective for the emission of electrons from a metallic surface?
(a) Microwaves (b) X rays
(c) Ultraviolet (d) Infrared

Q54. Which of the following regions does X-ray lie between?
(a) visible and ultraviolet regions
(b) short radio waves and long radio waves
(c) short radio waves and visible region
(d) gamma rays and ultraviolet region

Q55. Which of the following is a stable nucleus?
(a) The nucleus with even protons and odd electrons
(b) The nucleus with even number of protons and neutrons
(c) The nucleus with even neutrons and odd protons
(d) The nucleus with odd protons and neutrons

Q56. Isotones have the same number of
(a) Protons (b) Electrons
(c) Neutrons (d) All of the above

Q57. The manifestation of the band structure in solids is due to which of the following?
(a) Heisenberg's uncertainty principle
(b) Pauli's exclusion principle
(c) Bohr's correspondence principle
(d) Boltzmann's law

Q58. Which of the following is not a characteristic of LED?
(a) Fast action
(b) High Warm-up time
(c) Low operational voltage
(d) Long life

Q59. Which of the following should not be the characteristic of the solar cell material?
(a) High Absorption
(b) High Conductivity
(c) High Energy Band
(d) High Availability

Q60. In Zener diode, for currents greater than the knee current, the v-i curve is almost
(a) Almost a straight line parallel to y-axis
(b) Almost a straight line parallel to x-axis
(c) Equally inclined to both the axes with a positive slope
(d) Equally inclined to both the axes with a negative slope

CHEMISTRY (Q61 TO Q120)

Q61. What did Dalton propose?
(a) Law of Multiple Proportions
(b) Avogadro's Law
(c) Law of Definite Composition
(d) Law of Conservation of Mass

Q62. The total value of the magnetic quantum number are_____.
(a) 2n (b) 2l
(c) 2n + 1 (d) 2l + 1

Q63. Identify the de- Broglie expression from the following
(a) $\lambda = h \times P$ (b) $\lambda = {}^{h}/_{P}$
(c) $\lambda = h + P$ (d) $\lambda = h - P$

Q64. In the reaction, $H_{2(g)} + Br_{2(g)} = 2HBr_{(g)}$, what will happen if there is a change in pressure?
(a) equilibrium moves left
(b) equilibrium moves right
(c) there is no change in equilibrium
(d) we cannot say

Q65. Which of the following statements is correct with respect to electrolytic solutions?
(a) Its conductance increases with dilution
(b) Its conductance decreases with dilution
(c) Its conductivity increases with dilution
(d) Its equivalent conductance decreases with dilution

Q66. Lewis concept does explain the behaviour of_____.
(a) Bases
(b) Salts
(c) Protonic acids
(d) Amphoteric substances

Q67. Precipitate is formed if ionic product is_____.
(a) greater than the solubility product
(b) less than the solubility product
(c) equal to the solubility product
(d) independent of the solubility product

Q68. The rate constant of a reaction is $K=3.28 \times 10^{-4} S^{-1}$. Find the order of the reaction.
(a) Zero order (b) First order
(c) Second order (d) Third order

Q69. What is the integrated rate equation for a first order reaction?
(a) $[A] = [A]_o e^{-kt}$ (b) $[A] = [A]_o / e^{-kt}$
(c) $[A] = [A]_o e^{-t}$ (d) $[A] = [A]_o e^{-k}$

Q70. Which of the following is not an example of an Ideal solution?
(a) Benzene + Toluene
(b) n-Hexane + n-Heptane
(c) Ethyl alcohol + Water
(d) Ethyl bromide + Ethyl chloride

Q71. What is the value of the Van't Hoff factor (i) for solutes that dissociate in water?
(a) > 1 (b) < 1
(c) = 0 (d) Not defined

Q72. Calculate the internal energy change when 2 moles of water at 0 degrees converts into ice at 0-degree centigrade?
(a) 12 KJ per mole (b) 6 KJ per mole
(c) 1 KJ per mole (d) 102 KJ per mole

Q73. The enthalpy and internal energy are the function of temperature for
(a) All Gases (b) Steam
(c) Water (d) Ideal Gas

Q74. The entropy of an isolated system can never___
(a) Increase
(b) Decrease
(c) Be zero
(d) None of the mentioned

Q75. Reaction is spontaneous if Gibbs free energy is
(a) Greater than zero (b) Equal to zero
(c) Less than zero (d) Infinity

Q76. The standard oxidation potential of Ni/Ni^{2+} electrode is 0.3 V. If this is combined with a hydrogen electrode in acid solution, at what pH of the solution with the measured e.m.f. be zero at 25°C? (Assume $[Ni^{2+}]$= 1M)
(a) 5.08 (b) 4
(c) 4.5 (d) 5.25

Q77. What is the EMF of a galvanic cell if $E°_{cathode}$ = 0.80 volts and $E°_{anode}$ = -0.76 volts?
(a) 1.56 volts (b) 0.04 volts
(c) -1.56 volts (d) -0.04 volts

Q78. Choose the correct order of molar ionic conductivities of the following ions.
(a) $Li^+ < Na^+ < K^+ < Rb^+$
(b) $Li^+ < K^+ < Rb^+ < Na^+$
(c) $Li^+ < Na^+ < Rb^+ < K^+$
(d) $Li^+ < Rb^+ < Na^+ < K^+$

Q79. The graph for Boyle's law is called
(a) Isotherm (b) Hypertherm
(c) Hypotherm (d) None of above

Q80. The role of diffusion of gases is governed by
(a) Graham's law (b) Dalton's law
(c) Avogadro's law (d) Newton's law

Q81. The efficiency of packing is 68% in
(a) bcc structure (b) ccp structure
(c) fcc structure (d) hcp structure

Q82. Schottky defect in a crystal is observed when
(a) The ion leaves its normal position and occupies an interstitial location
(b) the unequal number of cation and anions are missing from the lattice
(c) the density of the crystal increases.
(d) an equal number of cations and anions are missing from the lattice.

Q83. According to Freundlich adsorption isotherm, which of the following is correct?
(a) $\frac{x}{m} \alpha P^1$
(b) $\frac{x}{m} \alpha P^{1/m}$
(c) $\frac{x}{m} \alpha P°$
(d) All are correct of different ranges of pressure

Q84. Which theory best suits for homogeneous catalysis?
(a) Intermediate (b) Absorption
(c) Nucleate (d) Paratoid

Q85. The correct order of the first ionization potentials among the following elements: Be, B,C, NQ is
(a) B<Be<C<O<N (b) B<Be<C<N<O
(c) Be<B<C<N<O (d) Be<B<C<O<N

Q86. The attributes of corresponding elements are the periodic functions of the_____.
(a) Atomic Weights
(b) Atomic Number
(c) Chemical properties
(d) No. of protons

Q87. Which of the following molecule doesn't involve covalent bond?
(a) H_2O (b) CCl_4
(c) NaCl (d) O_2

Q88. The shape and hybridisation in BF_3 is
(a) sp^2, linear (b) sp^3d, plannar
(c) sp^2, planar (d) sp^3 planar

Q89. Which of the following is correct regarding repulsive interaction?
(a) Lone pair-Lone pair is greater than Lone pair-Bond pair is greater than Bond pair-Bond pair
(b) Lone pair-Lone pair is less than Lone pair-Bond pair is less than Bond pair-Bond pair
(c) Lone pair-Bond pair is greater than Lone pair-Lone pair is greater than Bond pair-Bond pair
(d) Lone pair-Lone pair is greater than Lone pair-Bond pair is less than Bond pair-Bond pair

Q90. Which of the following species have maximum number of unpaired electrons
(a) O_2 (b) O_2^+
(c) O_2^- (d) O_2^{2-}

Q91. Alkali metals are strongly
(a) neutral (b) electropositive
(c) electronegative (d) non-metallic

Q92. The relative Lewis acid strengths of boron trihalides are in the
(a) BBr3>BC13>BF3
(b) BC13>BF3> BBr3
(c) BF3>BC13> BBr3
(d) BF3>BBr3>BCl3

Q93. How many types of oxides do Carbon family form?
(a) 9 (b) 4
(c) 3 (d) 2

Q94. The increasing order of reducing power of the halogen acids is
(a) HF < HCl < HBr < HI
(b) HI < HBr < HCl < HF
(c) HBr < HCl < HF < HI
(d) HCl < HBr < HF < HI

Q95. Which of the following is amphoteric?
(a) CrO (b) Cr_2O_3
(c) CrO_5 (d) CrO_3

Q96. Which of the following is an alloy of iron?
(a) Vitallium (b) Brass
(c) Invar (d) Solder

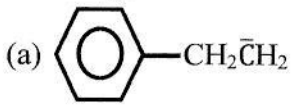
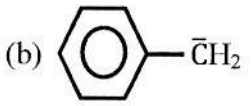
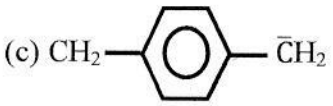
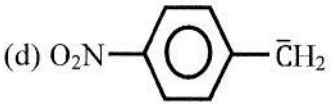
Q97. The name of $[Co(NH_2)_3 (NO_2)_3]$ is
(a) Trinitrotriamminecobalt(III)
(b) Trinjtrotriamminecobalt(II)
(c) Trirtitrotriamjninecobalt (III) ion
(d) Trinitrotriamminecobaltate (III)

Q98. What was the term proposed by Werner for the number of groups bound directly to the metal ion in a coordination complex?
(a) Primary valence
(b) Secondary valence
(c) Oxidation number
(d) Polyhedra

Q99. Which of the following complexes shows zero crystal field stabilization energy?
(a) $[Co(H_2O)_6]^{3+}$ (b) $[Fe(H_2O)_6]^{3+}$
(c) $[Co(H_2O)_6]^{2+}$ (d) $[Mn(H_2O)_6]^{3+}$

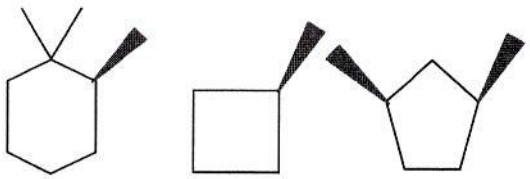
Q100. Which of the following do not show geometrical isomerism? (Assume all ligands are unidentate)
(a) Square planar $[MXL_3]$
(b) Square planar $[MX_2L_2]$
(c) Octahedral $[MX_2L_4]$
(d) Octahedral $[MX_3L_3]$

Q101. The IUPAC name of acetylsalicylic acid is
(a) 2-acetoxy benzoic acid
(b) 1-acetoxy benzoic acid
(c) 4-acetoxy benzoic acid
(d) 3-acetoxy benzoic acid

Q102. The most stable carbanion among the following is
(a) 
(b) 
(c) 
(d) 

Q103. Which of the following is incorrect for electrophilic substitution?
(a) $-NO_2$ is deactivating and m-directing
(b) –CI is activating and o, p-directing
(c) –OH is activating and o, P-directing
(d) $-CH_3$ is activating and o, p-directing

Q104. If a compound has 3 chiral carbons What is the number of optically active isomers?
(a) 9 (b) 3
(c) 4 (d) 8

Q105. Which of the following compound(s) is/are chiral?


(a) Only A and B (b) Only B
(c) Only B and C (d) Only A

Q106. What is the relationship between (1R,2S)-dibromocyclohexane and (1S,2R)-dibromocyclohexane?
(a) identical
(b) enantiomers
(c) diastereomers
(d) constitutional isomers

Q107. How are alcohols prepared from haloalkanes?
(a) By treating with concentrated H_2SO_4
(b) By heating with aqueous NaOH
(c) By treating with a strong reducing agent
(d) By treating with Mg metal

Q108. Iodoform can be prepared from all except:
(a) isopropyl alcohol
(b) 3-methyl-2-butanone
(c) isobutyl alcohol
(d) ethyl methyl ketone

Q109. Which of the following methods cannot produce aldehydes?
(a) Oxidation of primary alcohols
(b) Dehydrogenation of secondary alcohols
(c) Ozonolysis of alkenes
(d) Hydration of ethyne with acid

Q110. Which of the following acids does not form anhydride?
(a) Formic add
(b) Acetic acid
(c) Propionic add
(d) n-butyric acid

Q111. Trans-esterification is a reaction between
(a) two ester molecules
(b) alcohol and carboxylic acid
(c) alcohol and ether
(d) alcohol and ester.

Q112. Hydrolysis of alkyl isocyanide yielde
(a) primary amine
(b) tert. amine
(c) alcohol
(d) aldehyde

Q113. Which of the following statements concerning methylamine is correct?
(a) Methylamine is stronger base than NH_3
(b) Methylamine is less basic than NH_3
(c) Methylamine is slightly acidic
(d) Methylamine forms salts with alkali

Q114. Oxidation of aniline with $K_2Cr_2O_7/H_2SO_4$ gives
(a) phenylhydroxylamine
(b) p-benzoquinone
(c) nitrosobenzene
(d) nitrobenzene

Q115. Molisch test is used for the detection of:
(a) fats (b) carbohydrates
(c) alkyl halide (d) alkaloid

Q116. Greenhouses gases causing a rise of 3°C rise in the overall global temperature in the past century are CFCs. The CFC used in refrigerators is
(a) Ammonia (b) Freon
(c) Methane (d) Carbon dioxide

Q117. This is not a possible adverse effect of global warming
(a) sea level rise
(b) an increase of UVB radiation
(c) retreat of glaciera
(d) extraordinary weather patterns

Q118. Addition polymerisation is also known as,
(a) copolymerisation
(b) homopolymerisation
(c) step growth polymerisation
(d) chain growth polymerisation

Q119. Which of the following is not a natural polymer?
(a) Rayon (b) Starch
(c) Cellulose (d) RNA

Q120. Which of the following is a non biodegradable polymer?
(a) PHB (b) PGA
(c) LDPE (d) PHBV

MATHEMATICS (Q121 TO Q180)

Q121. Which of the following statement is true?
(a) $3 \subseteq \{1,3,5\}$ (b) $3 \in \{1,3,5\}$
(c) $\{3\} \in \{1,3,5\}$ (d) $\{3,5\} \in \{1,3,5\}$

Q122. Which of the following is a null set:
(a) A= $\{x: x\ is\ > 1\ and\ x\ < 1\}$
(b) B= $\{x: x + 3 = 3\}$
(c) C= $\{\emptyset\}$
(d) D= $\{x: x \geq 1\ and\ x \leq 1\}$

Q123. Let $f: x \to y$ be a given function, then f^{-1} exists if
(a) f is one-one
(b) f is onto
(c) f is one-one but not onto
(d) f is one-one and onto

Q124. If n (A) = 4 and n (B) = 2, then the number of surjection from A to B is:
(a) 14 (b) 2
(c) 8 (d) None of these

Q125. Let R be a relation on set A such that $R = R^{-1}$, then R is
(a) Reflexive (b) Symmetric
(c) Transitive (d) None of these

Q126. Let R be a relation on N defined as x R y iff $x + 2y = 8$, the domain of R is
(a) {2,4,8} (b) {2,4,6,8}
(c) {2,4,6} (d) {1,2,3,4}

Q127. The conjugate complex number of $\frac{2-i}{1-2i^2}$ is
(a) $\frac{2}{25} + \frac{11}{25}i$ (b) $\frac{2}{25} - \frac{11}{25}i$
(c) $\frac{-2}{25} + \frac{11}{25}i$ (d) $\frac{-2}{25} - \frac{11}{25}i$

Q128. The value of $\left(\frac{1+i\sqrt{3}}{1-i\sqrt{3}}\right)^6 + \left(\frac{1-i\sqrt{3}}{1+i\sqrt{3}}\right)^6$ is
(a) 2 (b) 12
(c) 14 (d) 0

Q129. The maximum value of $P = 8x + 3y$, subject to the constraints $x + y \leq 6, x \geq 0, y \geq 0$ is
(a) 2 (b) -2
(c) 14 (d) 16

Q130. "The maximum or the minimum of the objectives function occurs only at the corners points of the feasible region". This theorem is known as fundamental theorem of
(a) Algebra (b) Arithmetic
(c) Calculus (d) Extreme Points

Q131. The solution of the inequation $\frac{1}{2x-5} > 0$ is
(a) $\left[-\frac{5}{2}, \infty\right]$ (b) $\left[\frac{5}{2}, \infty\right]$
(c) $\left[-\infty, \frac{5}{2}\right]$ (d) $\left[\infty, \frac{5}{2}\right]$

Q132. If $2 < x < 3$, then
(a) $|x-3| < |x-2|$
(b) $(x-3) > (x-2)$
(c) $(x-3)(x-2) < 0$
(d) $\frac{x-3}{x-2} > 0$

Q133. The value of n, for which $\frac{a^{n+1}+b^{n+1}}{a^n+b^n}$ is the A.M between a and b is
(a) 0 (b) 1
(c) $-\frac{1}{2}$ (d) -1

Q134. In a G.P of $(m+n)^{th}$ term is P and the $(m-n)^{th}$ term is q, then its m^{th} term is
(a) 0 (b) Pq
(c) $\sqrt{Pq}$ (d) $\frac{1}{2}(P+q)$

Q135. 5 books in math and there books in Physics are placed on a shelf so that the books on the same subject always remain together. The possible arrangements are
(a) 1440 (b) 1956
(c) 720 (d) None of these

Q136. There are 15 points in a plane, no three of which in a straight line, except 6, all of which are in a straight line. The number of straight which can be drawn by joining them is:
(a) ${}^{15}C_2 - 6$ (b) ${}^{15}C_2 - {}^{6}C_2$
(c) ${}^{15}C_2 - {}^{6}C_2 - 1$ (d) ${}^{15}C_2 - {}^{6}C_2 + 1$

Q137. For the positive integer ${}^{n}C_1 + {}^{n}C_2 + {}^{n}C_3 + \cdots\cdots\cdots + {}^{n}C_n$ is equal to
(a) 2^n (b) $2^n - 1$
(c) n^2 (d) $n^2 - 1$

Q138. The term independent of x in the expansion of $\left(x - \frac{3}{x^2}\right)^{18}$ is
(a) ${}^{18}C_6$ (b) ${}^{18}C_6 (3)^6$
(c) ${}^{18}C_6 (3)^{-6}$ (d) 3^6

Q139. If $a^2 + b^2 + c^2 = 0$ and
$$\begin{vmatrix} b^2+c^2 & ab & ac \\ ab & c^2+a^2 & bc \\ ac & bc & a^2+b^2 \end{vmatrix} = ka^2b^2c^2$$
then k is equal to
(a) 1 (b) 2
(c) 3 (d) 4

Q140. If $A = \begin{vmatrix} 2 & 0 & 0 \\ 0 & \cos x & \sin x \\ 0 & -\sin x & \cos x \end{vmatrix}$ then $(Adj)^{-1} =$
(a) A (b) 2A
(c) $\frac{1}{2}A$ (d) None of these

Q141. The system of linear equations $x + y + z = 2$, $2x + y - z = 3$, $3x + 2y + kz = 4$ has a unique solution if
(a) $k \neq 0$ (b) $-kx < 1$
(c) $-2 < 2 < 2$ (d) $k = 0$

Q142. If a matrix A is symmetric as well as skew symmetric then A is a
(a) Diagonal matrix (b) Null matrix
(c) Unit matrix (d) None of these

Q143. $\lim_{x \to 0} \frac{5^x+4^x}{4^x-3^x}$ is equal to
(a) 0 (b) $log^{(5/4)}/log^{(4/3)}$
(c)1 (d) None of these

Q144. $\lim_{x \to 0} \left(\frac{tan\ x-x}{x}\right) \cdot \left(sin\frac{1}{x}\right)$ is equal to
(a) 0
(b) 1
(c) A real number other than 0 and 1
(d) None of these

Q145. Let $f(x) = \frac{1-cos\ Px}{x\ sin\ x}$ when $x \neq 0$ and $f(0) = \frac{1}{2}$. If f is continuous at $x = 0$, then P is equal to
(a) 2 (b) -2
(c) 1 or -1 (d) None of these

Q146. The derivative of $f(x) = |x| = 0$ is
(a) 0 (b) 1
(c) -1 (d) None of these

Q147. $\frac{d}{dx}\left\{tan^{-1}\left(\frac{3x-x^3}{1-3x^2}\right)\right\}$ is equal to
(a) $\frac{3}{1+x^2}$ (b) $\frac{3}{1+9x^2}$
(c) $sec^2 3x$ (d) $\frac{1}{1+x^2}$

Q148. $\frac{d}{dx}\left(x\sqrt{a^2}-x^2+a^2 sin^{-1}\left(\frac{x}{a}\right)\right)$ is equal to
(a) $\sqrt{a^2-x^2}$ (b) $2\sqrt{a^2-x^2}$
(c) $\frac{1}{\sqrt{a^2-x^2}}$ (d) None of these

Q149. Let $f(x) = x^3 - 6x^2 + 9x + 8$, then $f(x)$ is decreasing in
(a) $(-\infty, 1)$ (b) $[1, 3]$
(c) $[3, \infty)$ (d) $(-\infty, 1) \cup (3, \infty)$

Q150. The function $f(x) = 2 + 4x^2 + 6x^4 + 8x^6$ has
(a) Only one maxima
(b) Only one minima
(c) No maxima and minima
(d) Many maxima and minima

Q151. If $\sin(\pi\ cos\ \theta) = \cos(\pi\ sin\ \theta)$, then value of $cos\left(\theta + \frac{\pi}{4}\right)$ is
(a) $\frac{1}{\sqrt{2}}$ (b) $\frac{2}{\sqrt{2}}$
(c) $\frac{1}{\sqrt[2]{2}}$ (d) $-\frac{1}{\sqrt[2]{2}}$

Q152. The general solution of x satisfying the equation $\sqrt{3}\sin x + \cos x = \sqrt{3}$, is given by
(a) $x = n\pi \pm \frac{\pi}{3}$
(b) $x = n\pi \pm \frac{\pi}{6}$
(c) $x = n\pi + (-1)^n \frac{\pi}{3} - \frac{\pi}{6}$
(d) $x = n\pi + (-1)^n \frac{\pi}{4} + \frac{\pi}{3}$

Q153. The domain of the function $sin^{-1}x$ is
(a) $[-\pi, \pi]$ (b) $[-1, 1]$
(c) $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$ (d) $[0, 2\pi]$

Q154. $tan^{-1}\left(\frac{x}{y}\right) - tan^{-1}\left(\frac{x-y}{x+y}\right)$ is
(a) $\pi/2$ (b) $\pi/3$
(c) $\pi/4$ (d) None of these

Q155. If the length of a chord of a circle is equal to that of radius of the circle, then the angle subtended in radius, at the centre of the circle by chord is
(a) 1 (b) $\pi/2$
(c) $\pi/3$ (d) $\pi/4$

Q156. If $\tan x = \frac{m}{m+1}$, $\tan \beta = \frac{1}{2m+1}$, then $(\alpha + \beta)$ is equal to
(a) $\pi/2$ (b) $\pi/4$
(c) $\pi/6$ (d) None of these

Q157. $\int \frac{xe^x}{(1+x)^2} dx$ is equal to
(a) $\frac{-e^x}{1+x}$ (b) $\frac{1+2xe^x}{1+x}$
(c) $\left(\frac{1+2xe^x}{1+x}\right)$ (d) $\frac{e^x}{1+x}$

Q158. $\int \sqrt{x^2+a^2} dx$ is equal to
(a) $\log|x + \sqrt{x^2+a^2}|$
(b) $\frac{x\sqrt{x^2+a^2}}{2} - \frac{a^2}{2} log|x + \sqrt{x^2+a^2}|$
(c) $\frac{x\sqrt{x^2+a^2}}{2} + \frac{a^2}{2}\log|x + \sqrt{x^2+a^2}|$
(d) None of these

Q159. The value of $\int_0^{2\pi} \sqrt{\left(1+sin\frac{x}{2}\right)}\, dx$ is

(a) 0 (b) 2
(c) 8 (d) 4

Q160. If $\int_0^{2a} f(x)\, dx = 2\int_0^{a} f(x)\, dx$, then

(a) $f(2a-x) = -f(x)$
(b) $f(2a-x) = f(x)$
(c) $f(x)$is an odd function
(d) $f(x)$ is an even function

Q161. The value of $\int_0^{\pi/2} \frac{\tan x}{tan\ x+cot\ x}\, dx$ is

(a) 0 (b) $\frac{\pi}{2}$
(c) $\frac{\pi}{4}$ (d) None of these

Q162. The order of the differential equation

$$\left[1+\left(\frac{dy}{dx}\right)^2\right]^{3/2} = \frac{d^2y}{dx^2}\text{is}$$

(a) 1 (b) 2
(c) 3 (d) 4

Q163. The area enclosed between the curve $y^2 = 4x$ line $y = x$ is

(a) $\frac{2}{3}$ (b) $\frac{4}{3}$
(c) $\frac{1}{2}$ (d) $\frac{8}{3}$

Q164. The points $(-a,-b),(0,0),(a,b) and\ (a^2,ab)$ are

(a) Vertical of a triangle
(b) Vertical of a square
(c) Vertical of a parallelogram
(d) Collinear

Q165. The inclination of the straight line passing through the point (-3, 6) and the mid point of the line joining the points, (4,-5) and (-2,9) is

(a) $\frac{\pi}{4}$ (b) $\frac{\pi}{6}$
(c) $\frac{\pi}{3}$ (d) $\frac{3\pi}{4}$

Q166. The coordination of the foot of the perpendicular from (a, o) on the line $y = mx + \frac{a}{m}$ are

(a) $\left(0,-\frac{a}{m}\right)$ (b) $\left(\frac{a}{m},0\right)$
(c) $\left(0,\frac{a}{m}\right)$ (d) None of these

Q167. If the line $x-1=0$ is the direction of the parabola $y^2 - kn + 8 = 0$, then one of the values of k is

(a) $\frac{1}{8}$ (b) 8
(c) 4 (d) $\frac{1}{4}$

Q168. Equation of the ellipse with eccentricity $\frac{1}{2}$ and foci at $(\pm1,0)$ is

(a) $\frac{x^2}{3}+\frac{y^2}{4}=1$ (b) $\frac{x^2}{4}+\frac{y^2}{3}=1$
(c) $\frac{x^2}{4}+\frac{y^2}{3}=\frac{4}{3}$ (d) None of these

Q169. For a frequency distribution, the mean deviation about mean is computed by

(a) M.D $=\frac{\Sigma di}{\Sigma fi}$ (b) M.D $=\frac{\Sigma fidi}{\Sigma fi}$
(c) M.D $=\frac{\Sigma fi\ |di|}{\Sigma fi}$ (d) M.D $=\frac{\Sigma fi}{\Sigma fi\ |di|}$

Q170. The standard deviation of 25 numbers is. If each of the numbers is increased by 5, Then the new standard deviation will be

(a) 40 (b) 45
(c) $40+\frac{21}{25}$ (d) None of these

Q171. If P$[E_1] = P_1$ and $E_1\ and\ E_2$ are mutually exclusive, then P$[neither\ E_1\ nor\ E_2]$ is equal to

(a) $(1-P_1)(1-P_2)$ (b) $1-(P_1+P_2)$
(c) P_1+P_2-1 (d) None of these

Q172. A bag contains 5 white, 7 red and 4 black balls. Four balls are drawn one by one with replacement. The chance that at least two balls are black is

(a) $\frac{67}{256}$ (b) $\frac{54}{256}$
(c) $\frac{243}{256}$ (d) None of these

Q173. If A and B are two events and P$(A\cup B)=\frac{5}{6}$, P$(A\cap B)=\frac{1}{3}$, $P(\bar{B})=\frac{1}{2}$, then A and B are

(a) Dependent
(b) Independent
(c) Mutually Exclusive
(d) None of these

Q174. A die is tossed 5 times, getting an odd number is considered a success. Then the variance of distribution of number of success is

(a) $\frac{8}{3}$ (b) $\frac{3}{8}$

(c) $\frac{4}{5}$ (d) $\frac{5}{4}$

Q175. If $\vec{a}$ is a non-zero vector and k is a scalar such that $|k\vec{a}| = 1$, then k is equal to

(a) $|\vec{a}|$ (b) 1

(c) $\frac{1}{|\vec{a}|}$ (d) $\pm \frac{1}{|\vec{a}|}$

Q176. If θ is the angel between two vectors $\vec{a}$ *and* $\vec{b}$, then $\frac{|\vec{a} \times \vec{b}|}{|\vec{a} \cdot \vec{b}|}$ equals to

(a) cot θ (b) –cot θ

(c) tan θ (d) –tan θ

Q177. The unit vector perpendicular to each of the vectors $(2\hat{\imath} - \hat{\jmath} + \hat{k})$ and $(3\hat{\imath} + 4\hat{\jmath})$ is

(a) $\frac{1}{\sqrt{146}}(4\hat{\imath} - 3\hat{\jmath} + 11\hat{k})$

(b) $\frac{1}{\sqrt{146}}(-4\hat{\imath} + 3\hat{\jmath} + 11\hat{k})$

(c) $\frac{1}{\sqrt{146}}(4\hat{\imath} + 3\hat{\jmath} + 11\hat{k})$

(d) $\frac{1}{146}(-4\hat{\imath} + 3\hat{\jmath} + 11\hat{k})$

Q178. The plane xoz divides the join of (1,-1, 5) and (2, 3, 5) in the ratio λ: 1, then λ is

(a) -3 (b) $-\frac{1}{3}$

(c) 3 (d) $\frac{1}{3}$

Q179. The value of k so that $\frac{x-1}{-3} = \frac{y-2}{2k} = \frac{z-3}{2}$ and $\frac{x-1}{3k} = \frac{y-1}{1} = \frac{z-6}{-5}$ may be perpendicular is given by

(a) -10 (b) $\frac{10}{7}$

(c) $-\frac{10}{7}$ (d) $-\frac{7}{10}$

Q180. Angel between the line $\vec{r} = (2\hat{\imath} - \hat{\jmath} + \hat{k}) + \lambda(-\hat{\imath} + \hat{\jmath} + \hat{k})$ and the plane $\vec{r} \cdot (3\hat{\imath} + 2\hat{\jmath} - \hat{k}) = 4$

(a) $cos^{-1}\left(\frac{2}{\sqrt{42}}\right)$ (b) $cos^{-1}\left(\frac{-2}{\sqrt{42}}\right)$

(c) $sin^{-1}\left(\frac{2}{\sqrt{42}}\right)$ (d) $sin^{-1}\left(\frac{-2}{\sqrt{42}}\right)$