JKCET 2024 Question Paper

Time Allowed :3 Hours	**Maximum Marks :**180	**Total questions :**180

General Instructions

Read the following instructions very carefully and strictly follow them:

Mode of Examination: Offline

Duration: 3 hours

Medium of Language: English

Total Number of Questions: 180

Type of Questions: Multiple Choice Questions

Negative Marking: -0.25 mark for each incorrect answer

Physics

1. What is the unit of measurement of solid angles?

(a) Steradian

(b) Degrees

(c) Radians

(d) Grades

---

2. 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

---

3. 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

---

4. 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

---

5. 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

---

6. 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

---

7. 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

---

8. 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

---

9. 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

---

10. 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

---

11. 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

---

12. 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

---

13. 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

---

14. 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

---

15. 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

---

16. Hess's law states that a chemical reaction is independent of the route by which chemical reactions take place while keeping the same

(a) initial conditions only

(b) final conditions only

(c) mid-conditions

(d) initial and final conditions

---

17. 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

---

18. Which of the following is not a gas law?

(a) Boyle's law

(b) Charles law

(c) Hooke's law

(d) Gay Lussac's law

---

19. 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 $\frac{a}{v^2}$ is the force of cohesion and b is the coefficient related to volume of molecules.

(a) $\left(p + \frac{a}{v^2}\right)(v + b) = RT$

(b) $\left(p - \frac{a}{v^2}\right)(v - b) = RT$

(c) $\left(p + \frac{a}{v^2}\right)(v - b) = RT$

(d) $\left(p - \frac{a}{v^2}\right)(v + b) = RT$

---

20. Which of the following has a mole ratio 1:1?

(a) 7g of N and 12g of Na

(b) 20g of Na and 20g of Ca

(c) 14g of N and 24g of Mg

(d) 10g of Ca and 6g of C

---

21. 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

---

22. 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

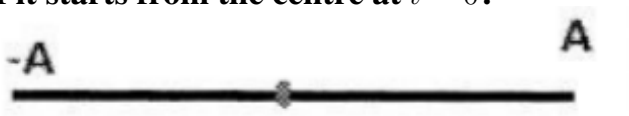
(b) Both statement and reason are true but the reason is not the correct explanation of the statement

(c) Statement is true, but the reason is false

(d) Statement and reason are false

---

23. 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

---

24. 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

---

25. 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

---

26. 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

---

27. Two charges Q_1 and $-Q_2$ 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) $\frac{1}{48}F$

---

28. 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

---

29. 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

---

30. 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 Density

(c) Current

(d) None of these

---

31. 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

---

32. 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

---

33. 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

---

34. If the current I flows through the coil of radius r, then the field at the center of the circular coil is

(a) Inversely proportional to I^2

(b) Directly proportional to I

(c) Directly proportional to r

(d) Inversely proportional to r^2

---

35. Which among the following is denoted by δ?

(a) Horizontal component

(b) Magnetic meridian

(c) Magnetic declination

(d) Magnetic inclination

---

36. 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

---

37. 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° with the plane of the coil

(d) The magnetic field is perpendicular to the plane

---

38. Which of the following factors is the self-inductance associated with a coil independent of?

(a) induced voltage

(b) current

(c) time

(d) coil resistance

39. Find the force due to a current element of length 2 cm and flux density of 12 tesla. The current through the element will be 5A.

(a) 1 N

(b) 1.2 N

(c) 4 N

(d) 1.6 N

---

40. 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

---

41. _____ 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

---

42. 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

---

43. Which type of transmission line accepts the Transverse electromagnetic wave?

(a) Copper cables

(b) Coaxial cable

(c) Rectangular waveguides

(d) Circular waveguides

---

44. Which of the following cannot travel in vacuum?

(a) Radio waves

(b) Gamma waves

(c) Infrared waves

(d) Infrasonic waves

---

45. 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

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46. 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

---

47. 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

---

48. 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

---

49. 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

---

50. 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

---

51. 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

---

52. 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

---

53. Which radiations will be most effective for the emission of electrons from a metallic surface?

(a) Microwaves

(b) X-rays

(c) Ultraviolet

(d) Infrared

---

54. 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

---

55. 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

---

56. Isotones have the same number of

(a) Protons

(b) Electrons

(c) Neutrons

(d) All of the above

---

57. 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

---

58. 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

---

59. 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

---

60. 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

61. What did Dalton propose?

(a) Law of Multiple Proportions

(b) Avogadro's Law

(c) Law of Definite Composition

(d) Law of Conservation of Mass

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62. The total value of the magnetic quantum number is

(a) $2n$

(b) $2l$

(c) $2n + 1$

(d) $2l + 1$

---

63. Identify the de-Broglie expression from the following

(a) $\lambda = h \times p$

(b) $\lambda = h + p$

(c) $\lambda = h - p$

(d) $\lambda = \frac{h}{p}$

---

64. 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

---

65. 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

---

66. Lewis concept does explain the behaviour of

(a) Bases

(b) Salts

(c) Protonic acids

(d) Amphoteric substances

---

67. 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

---

68. The rate constant of a reaction is $K = 3.28 \times 10^{-4}\,\mathbf{s}^{-1}$. Find the order of the reaction.

(a) Zero order

(b) First order

(c) Second order

(d) Third order

---

69. What is the integrated rate equation for a first-order reaction?

(a) $[A] = [A_0]e^{-kt}$

(b) $[A] = \frac{[A_0]}{e^{-kt}}$

(c) $[A] = [A_0]e^{-t}$

(d) $[A] = [A_0]e^{-k}$

---

70. 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

---

71. 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

---

72. 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

---

73. The enthalpy and internal energy are the function of temperature for

(a) All Gases

(b) Steam

(c) Water

(d) Ideal Gas

---

74. The entropy of an isolated system can never

(a) Increase

(b) Decrease

(c) Be zero

(d) None of the mentioned

---

75. Reaction is spontaneous if Gibbs free energy is

(a) Greater than zero

(b) Equal to zero

(c) Less than zero

(d) Infinity

---

76. 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 will 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

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77. What is the EMF of a galvanic cell if $E^{\circ}_{\textbf{cathode}} = 0.80$ **volts and** $E^{\circ}_{\textbf{anode}} = -0.76$ **volts**?

(a) 1.56 volts

(b) 0.04 volts

(c) -1.56 volts

(d) -0.04 volts

---

78. 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) $Li^+ < Rb^+ < Na^+ < K^+$

---

79. The graph for Boyle's law is called

(a) Isotherm

(b) Hypertherm

(c) Hypotherm

(d) None of above

---

80. 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

---

81. The efficiency of packing is 68% in

(a) BCC structure

(b) CCP structure

(c) FEC structure

(d) HEP structure

---

82. 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.

---

83. 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) $\frac{x}{m}\alpha P^{0}$

(d) All are correct for different ranges of pressure

---

84. Which theory best suits for homogeneous catalysis?

(a) Intermediate

(b) Absorption

(c) Nucleate

(d) Paratoid

---

85. The correct order of the first ionization potentials among the following elements: Be, B, C, N, O is

(a) $B < Be < C < O < N$

(b) $B < Be < C < N < O$

(c) $Be < B < C < N < O$

(d) $Be < B < C < O < N$

---

86. The attributes of corresponding elements are the periodic functions of the

(a) Atomic Weights

(b) Atomic Number

(c) Chemical properties

(d) No. of protons

---

87. Which of the following molecule doesn't involve covalent bond?

(a) H_2O

(b) CCl_4

(c) NaCl

(d) O_2

---

88. The shape and hybridisation in BF_3 is

(a) sp^2, linear

(b) sp^3d, planar

(c) sp^2, planar

(d) sp^3, planar

---

89. 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

---

90. Which of the following species have maximum number of unpaired electrons?

(a) O_2

(b) O_2^+

(c) O_2^-

(d) O_2^{2-}

---

91. Alkali metals are strongly

(a) Neutral

(b) Electropositive

(c) Electronegative

(d) Non-metallic

---

92. The relative Lewis acid strengths of boron trihalides are in the

(a) $BBr_3 > BC_3 > BF_3$

(b) $BC_3 > BF_3 > BBr_3$

(c) $BF_3 > BC_3 > BBr_3$

(d) $BF_3 > BBr_3 > BC_3$

---

93. How many types of oxides do Carbon family form?

(a) 9

(b) 4

(c) 3

(d) 2

---

94. 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) $HCl < HBr < HF < HI$

---

95. Which of the following is amphoteric?

(a) CrO

(b) CrO_4

(c) Cr_2O_3

(d) CrO_3

---

96. Which of the following is an alloy of iron?

(a) Vitallium

(b) Brass

(c) Invar

(d) Solder

---

97. The name of $[Co(NH_2)_3](NO_2)_3$ is

(a) Trinitrotriamminecobalt(III)

(b) Trinitrotriamminecobalt(II)

(c) Trinitrotriamminecobalt(III) ion

(d) Trinitrotriamminecobaltate(III)

---

98. 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

---

99. 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) $[Mn(H_2O)_6]^{3+}$

---

100. 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 $[MX_3L_3]$

---

101. 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

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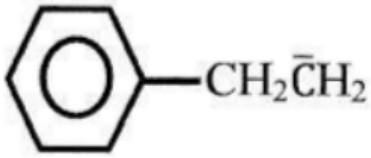
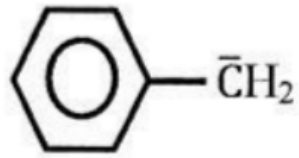
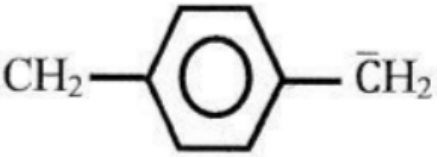
102. The most stable carbanion among the following is:

(a) 

(b) 

(c) 

(d) 

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103. Which of the following is incorrect for electrophilic substitution?

(a) $-NO_2$ is deactivating and m-directing

(b) -Cl is activating and o, p-directing

(c) -OH is activating and o, p-directing

(d) $-CH_3$ is activating and o, p-directing

---

104. If a compound has 3 chiral carbons, what is the number of optically active isomers?

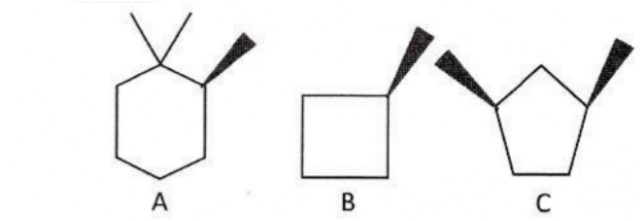
(a) 9

(b) 3

(c) 4

(d) 8

105. 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

---

106. What is the relationship between (1R,2S)-dibromocyclohexane and (1S,2R)-dibromocyclohexane?

(a) Identical

(b) Enantiomers

(c) Diastereomers

(d) Constitutional isomers

---

107. 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

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108. Iodoform can be prepared from all except:

(a) Isopropyl alcohol

(b) 3-methyl-2-butanone

(c) Isobutyl alcohol

(d) Ethyl methyl ketone

---

109. 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

---

110. Which of the following acids does not form anhydride?

(a) Formic acid

(b) Acetic acid

(c) Propionic acid

(d) n-butyric acid

---

111. Trans-esterification is a reaction between

(a) two ester molecules

(b) alcohol and carboxylic acid

(c) alcohol and ether

(d) alcohol and ester.

---

112. Hydrolysis of alkyl isocyanide yields

(a) primary amine

(b) tert. amine

(c) alcohol

(d) aldehyde

---

113. 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

---

114. Oxidation of aniline with $K_2Cr_2O_7/H_2SO_4$ gives

(a) phenylhydroxylamine

(b) p-benzoquinone

(c) nitrosobenzene

(d) nitrobenzene

---

115. Molisch test is used for the detection of:

(a) fats

(b) carbohydrates

(c) alkyl halide

(d) alkaloid

---

116. Greenhouse 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

---

117. This is not a possible adverse effect of global warming

(a) Sea level rise

(b) An increase of UVB radiation

(c) Retreat of glaciers

(d) Extraordinary weather patterns

---

118. Addition polymerization is also known as

(a) Copolymerisation

(b) Homopolymerisation

(c) Step growth polymerisation

(d) Chain growth polymerisation

---

119. Which of the following is not a natural polymer?

(a) Rayon

(b) Starch

(c) Cellulose

(d) RNA

---

120. Which of the following is a non-biodegradable polymer?

(a) PHB

(b) PGA

(c) LDPE

(d) PHBV

Mathematics

121. Which of the following statement is true?

(a) $3 \in \{1, 3, 5\}$

(b) $3 \in \{1, 3, 5\}$

(c) $\{3\} \in \{1, 3, 5\}$

(d) $\{3, 5\} \in \{1, 3, 5\}$

---

122. Which of the following is a null set?

(a) $A = \{x : x > 1 \text{ and } x < 1\}$

(b) $B = \{x : x + 3 = 3\}$

(c) $C = \emptyset$

(d) $D = \{x : x \geq 1 \text{ and } x \leq 1\}$

---

123. 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

---

124. If $n(A) = 4$ and $n(B) = 2$, then the number of surjections from A to B is:

(a) 14

(b) 2

(c) 8

(d) None of these

---

125. 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

---

126. Let R be a relation on $\mathbb{N}$ defined as xRy 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}

---

127. The conjugate complex number of

$$\frac{2-i}{1-2i^2}$$

(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) $\frac{-2}{25}-\frac{11}{25}i$

---

128. 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

---

129. 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

---

130. "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

---

131. The solution of the inequality $\frac{1}{2x-5} > 0$ is

(a) $\left[-\frac{5}{2}, \infty\right)$

(b) $\left(\frac{5}{2}, \infty\right)$

(c) $\left(-\infty, \frac{5}{2}\right)$

(d) $\left(\frac{5}{2}, \infty\right)$

---

132. If $2 < x < 3$, then

(a) $|x-3| < |x-2|$

(b) $(x-3) > (x-2)$

(c) $(x-3)(x-2) < 0$

(d) $\frac{x-3}{x-2} > 0$

---

133. 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

---

134. In a G.P. of $(m+n)^{\text{th}}$ term is P and the $(m-n)^{\text{th}}$ term is q, then its m^{th} term is

(a) 0

(b) Pq

(c) $\sqrt{Pq}$

(d) $\frac{1}{2}(P+q)$

---

135. 5 books in Math and 3 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

---

136. There are 15 points in a plane, no three of which are in a straight line, except 6, all of which are in a straight line. The number of straight lines 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) ${}^{15}C_2 - {}^{6}C_2 + 1$

---

137. For the positive integer n,

$$C_1^n + C_2^n + C_3^n + \cdots + C_n^n \text{ is equal to}$$

(a) 2^n

(b) $2^n - 1$

(c) n^2

(d) $n^2 - 1$

---

138. The term independent of x in the expansion of

$$\left(x - \frac{3}{x^2}\right)^{18}$$

(a) C_6^{18}

(b) $C_6 \cdot 3^6$

(c) $C_6 \cdot 3^{-6}$

(d) 3^6

---

139. 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

---

140. If $A=\begin{pmatrix} 2 & 0 & 0 \\ 0 & \cos x & \sin x \\ 0 & -\sin x & \cos x \end{pmatrix}$, then Adj$(A)^{-1}$ is

(a) A

(b) 2A

(c) $\frac{1}{2}A$

(d) None of these

---

141. The system of linear equations

$x+y+z=2, \quad 2x+y-2=3, \quad 3x+2y+kz=4$ has a unique solution if

(a) $k \neq 0$

(b) $k > -1$

(c) $-2 < 2 < 2$

(d) $k=0$

---

142. If a matrix A is symmetric as well as skew symmetric then A is

(a) Diagonal matrix

(b) Null matrix

(c) Unit matrix

(d) None of these

---

143. The limit $\lim_{x\to 0} \frac{5^x+4^x}{4^x-3^x}$ is equal to

(a) 0

(b) $\frac{\log(5/4)}{\log(4/3)}$

(c) 1

(d) None of these

---

144. The limit $\lim_{x\to 0} \left(\frac{\tan x - x}{x}\right) \cdot \left(\sin \frac{1}{x}\right)$ is equal to

(a) 0

(b) 1

(c) A real number other than 0 and 1

(d) None of these

---

145. 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

---

146. The derivative of $f(x) = |x|$ at $x = 0$ is

(a) 0

(b) 1

(c) -1

(d) None of these

---

147. The derivative of

$$\frac{d}{dx}\left(\tan^{-1}\left(\frac{3x-x^3}{1-3x^2}\right)\right) \text{ is equal to}$$

(a) $\frac{3}{1+x^2}$

(b) $\frac{3}{1+9x^2}$

(c) $\sec^2 3x$

(d) $\frac{1}{1+x^2}$

---

148. The derivative of

$$\frac{d}{dx}\left(x\sqrt{a^2}-x^2+a^2\sin^{-1}\left(\frac{x}{a}\right)\right) \text{ is equal to}$$

(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

---

149. 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) $(-\infty,1)\cup(3,\infty)$

---

150. 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

---

151. If $\sin(\pi\cos\theta) = \cos(\pi\sin\theta)$, then the value of

$$\cos\left(\theta + \frac{\pi}{4}\right)$$

(a) $\frac{1}{\sqrt{2}}$

(b) $\frac{2}{\sqrt{2}}$

(c) $\frac{1}{\sqrt{2}}$

(d) $-\frac{1}{\sqrt{2}}$

---

152. 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) $x = n\pi \pm (-1)^n \frac{\pi}{3}$

(d) $x = n\pi \pm (-1)^n \frac{\pi}{4}$

---

153. 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) $[0, 2\pi]$

---

154. The value of

$$\tan^{-1}\left(\frac{x}{y}\right) - \tan^{-1}\left(\frac{x-y}{x+y}\right) \text{ is}$$

(a) $\frac{\pi}{2}$

(b) $\frac{\pi}{3}$

(c) $\frac{\pi}{4}$

(d) None of these

---

155. 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 the chord is

(a) 1

(b) $\frac{\pi}{2}$

(c) $\frac{\pi}{3}$

(d) $\frac{\pi}{4}$

---

156. If $\tan x = \frac{m}{m+1}$**,** $\tan \beta = \frac{1}{2m+1}$**, then** $(\alpha + \beta)$ **is equal to**

(a) $\frac{\pi}{2}$

(b) $\frac{\pi}{4}$

(c) $\frac{\pi}{6}$

(d) None of these

---

157. The integral $\int \frac{xe^x}{(1+x)^2} dx$ **is equal to**

(a) $\frac{-e^x}{1+x}$

(b) $\frac{1+2xe^x}{1+x}$

(c) $(\frac{1+2xe^x}{1+x}$)

(d) $\frac{e^x}{1+x}$

---

158. The integral $\int \sqrt{x^2 + a^2}\, dx$ **is equal to**

(a) $\log |x + \sqrt{x^2 + a^2}|$

(b) $\frac{x\sqrt{x^2+a^2}}{2} - \frac{a^2 \log |x+\sqrt{x^2+a^2}|}{2}$

(c) $\frac{x\sqrt{x^2+a^2}}{2} + \frac{a^2 \log |x+\sqrt{x^2+a^2}|}{2}$

(d) None of these

---

159. The value of

$$\int_0^{2\pi} \sqrt{1 + \sin^2 \frac{x}{2}}\, dx \text{ is}$$

(a) 0

(b) 2

(c) 8

(d) 4

---

160. If

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

(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

---

161. The value of

$$\int_0^{\frac{\pi}{2}} \frac{\tan x}{\tan x + \cot x}\,dx \text{ is}$$

(a) 0

(b) $\frac{\pi}{2}$

(c) $\frac{\pi}{4}$

(d) None of these

---

162. The order of the differential equation

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

is

(a) 1

(b) 2

(c) 3

(d) 4

---

163. The area enclosed between the curve

$$y^2 = 4x, \quad \text{and the line } y = x \text{ is}$$

(a) $\frac{2}{3}$

(b) $\frac{4}{3}$

(c) $\frac{1}{2}$

(d) $\frac{8}{3}$

---

164. The points

$$(-a,-b),(0,0),(a,b), \text{ and } (a^2,ab)$$

are

(a) Vertical of a triangle

(b) Vertical of a square

(c) Vertical of a parallelogram

(d) Collinear

---

165. 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) $\frac{3\pi}{4}$

---

166. The coordinates of the foot of the perpendicular from $(a,0)$ 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

---

167. 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) $\frac{1}{4}$

---

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

---

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

(a) M.D = $\frac{\Sigma d_i}{\Sigma f_i}$

(b) M.D = $\frac{\Sigma f_i d_i}{\Sigma f_i}$

(c) M.D = $\frac{\Sigma f_i |d_i|}{\Sigma f_i}$

(d) M.D = $\frac{\Sigma f_i |d_i|}{\Sigma f_i}$

---

170. The standard deviation of 25 numbers is σ. 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

---

171. 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

---

172. 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

---

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

(a) Dependent

(b) Independent

(c) Mutually Exclusive

(d) None of these

---

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

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

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

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

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

---

175. 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) $\pm\frac{1}{|\vec{a}|}$

176. If θ is the angle between two vectors $\vec{a}$ and $\vec{b}$, then

$$|\vec{a} \times \vec{b}| = |\vec{a} \cdot \vec{b}|$$

equals to

(a) $\cot\theta$

(b) $-\cot\theta$

(c) $\tan\theta$

(d) $-\tan\theta$

---

177. The unit vector perpendicular to each of the vectors

$$(2\hat{i} - \hat{j} + \hat{k}) \text{ and } (3\hat{i} + 4\hat{j}) \text{ is}$$

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

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

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

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

---

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

(a) -3

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

(c) 3

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

---

179. The value of k so that

$$\frac{x-1}{-3} = \frac{y-2}{2k} = \frac{z-3}{2} = \frac{x-1}{3k} = \frac{y-1}{1} = \frac{z-6}{-5}$$

may be perpendicular is given by

(a) -10

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

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

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

---

180. Angle between the line

$$\vec{r} = (2\hat{i} - \hat{j} + \hat{k}) + \lambda(-\hat{i} + \hat{j} + \hat{k})$$

and the plane

$$\vec{r} \cdot (3\hat{i} + 2\hat{j} - \hat{k}) = 4$$

is

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