MHT CET SAMPLE PAPER 2025

Mock Test

SUBJECT : Physics /Chemistry

1 Twoluminouspointssourcesseparated by a certain distance are at 10 km from an observer. If the aperture of his eye is 2.5 x 10-3 m and the wavelengthoflightusedis500nmthedistance of separation between the point sources just seen to be resolved is

(A) 12.2 m

(B) 24.2 m

(C) 2.44 m

(D) 1.22 m

2 Adoor1.6mwiderequiresaforce of N to be applied at the free end to open or close it. The force that is required at a point 0.4 m distance fromthehingesforopeningorclosing the door is

(A) 1.2N

(B) 3.6N

(C) 2.4N

(D) 4 N

3 0.1m^3ofwaterat80C.The^{0}finaltemperature of the mixture is

(A) 65^{0}C

(B) 70^{0}C

(C) 60^{0}C

(D) 75^{0}C

4 Thespectralseriesofthehydrogenatom that lies in the visible region of the electromagnetic spectrum

(A) Paschen

(B) Balmer

(C) L yman

(D) Brackett

5 Aresistorandacapacitorareconnected inseries with an AC source. If the potential drop across the capacitor is 5 V and that across resistor is 12V,thenapplied voltageis

(A) 13V

(B) 17V

(C) 5 V

(D) 12V

6 Theamountofheatenergyradiatedby a metal at temperature T is E. When the temperature is increased to 3T, energy radiated is

(A) 81E

(B) 9 E

(C) 3 E

(D) 27E

7 Aman,ofmass60kg,isridinginalift. The weights of the man, when the lift is accelerating upwards and down wards at 2m/s2 are respectively (Taking g=2m/s^2)

(A) 720N and 480 N

(B) 480N and 720 N

(C) 600N and 800 N

(D) None of these

8 Schottkydefectinacrystalisobserved when ,

(A) Unequalnumberofcationsandanions are missing from the lattice

(B) Equalnumberofcationsandanions are missing from the lattice

(C) Anionleavesitsnormalsiteandoccupies an interstitial site

(D) No ion is missing from its lattice site

9 The simplest way to check whether a system is colloidal is by

(A) Electrodialysis

(B) Finding out particle size

(C) Tyndall effect

(D) Brownian movement

10 An example for a strong electrolyte is

(A) Urea

(B) Ammonium hydroxide

(C) Sugar

(D) Sodium acetate

11 An example of a salt that will not hydrolyse is

(A) CH_3COONH_4

(B) CH_3COOK

(C) NH_4Cl

(D) KCl

12 C14 is

(A) A natural non – radioactive isotope

(B) An artificial non – radioactive isotope

(C) An artificial radioactive isotope

(D) A natural radioactive isotope

13 A cuprous ore among the following is

(A) Cuprite

(B) Malachite

(C) Chalcopyrites

(D) Azurite

14 Smallest among these species is

(A) Lithium

(B) Lithium ion

(C) Hydrogen

(D) Helium

15 Sodium chloride is an ionic compound where as hydrogen chloride gas is mainly convalent because

(A) Electronegativity difference in the case of hydrogen in less than 2.1

(B) Hydrogen chloride is a gas

(C) Hydrogen is a non metal

(D) Sodium is reactive

16 Convalent compounds have low melting point because

(A) Convalent molecules are held by weak van der waal's force of attraction

(B) Convalent bond is less exothermic

(C) Convalent bond is weaker than ionic bond

(D) Convalent molecules have definite shape

17 Which of the following is an alloy of aluminium?

(A) magnalium

(B) duralumin

(C) brass

(D) both 'a' and 'b'

18 A neutral fertilizer among these compounds is

(A) Ammonium nitrate

(B) Urea

(C) CAN

(D) Ammonium sulphate

19 A condensation polymer among the following polymers is

(A) Teflon

(B) Polysterene

(C) PVC

(D) Decron

20 A compound that undergoes bromination easily is

(A) Toluene

(B) Benzoic acid

(C) Phenol

(D) Benzene

21 A sugar that is not a disaccharide among the following is

(A) Galactose

(B) Lactose

(C) Maltose

(D) Sucrose

22 Drying soil invariably contains

(A) Butyric acid

(B) Stearic acid

(C) Lauric acid

(D) Linoleic acid

23 Hetrocyclic amino acid among these compound is

(A) Lysine

(B) Tyrosine

(C) Proline

(D) Serine

24 Aluminium oxide is not reduced by chemical reactions since

(A) Reducing agent contaminate

(B) The process pollute the environment

(C) Aluminium oxide is highly stable

(D) Aluminium oxide is reactive

25 Iron loses magnetic property at

(A) Melting point

(B) 1000 K

(C) Curie point

(D) Boiling point

26 An example for a double salt is

(A) Potassium ferricyanide

(B) Cobalt hexamine chloride

(C) Cuprous sulphate

(D) Mohr’s salt

27 The set of compounds in which the reactivity of halogen atom in the ascending order is

(A) Viny1 chloride, chloroethane, chlorobenzene

(B) Viny1 chloride, chlorobenzene, chloroethane
(C) chloroethane, chlorobenzene, Viny1 chloride
(D) chlorobenzene, Viny1 chloride, chloroethane

28 Which one of the following pairs does not have the same dimension ?
(A) Potential energy and Kinetic energy
(B) Density and specific gravity
(C) Focal length and height
(D) Gravitational force and frictional force

29 Which one of the following physical quantity has the same unit as that of pressure ?
(A) Angular momentum
(B) Stress
(C) Strain
(D) Work

30 The symbol of SI unit of inductance is H. It stands for
(A) Holm
(B) Halogen
(C) Henry
(D) Hertz

31 A ball is dropped from a window 24 meters high. How long will it take to reach the ground ?
(A) 2.2 s
(B) 1.2 s
(C) 4.5 s
(D) 0.2s

32 Mohan takes 20 minutes to cover a distance of 3.2 kilometers due north on a bicycle, his velocity in kilometer/hour-
(A) 8.1
(B) 9.6
(C) 1.2
(D) 7.2

33 A Pitcher throws his fastball horizontally at 42.1 meters per second. How far does it drop before crossing the plate, 18.3 meters away ?
(A) 0.8 m
(B) 1.2m
(C) 2.2m
(D) 0.93 m

34 Two balls A and B of same masses are thrown from the top of the building. A, thrown upward with velocity V and B, thrown downward with velocity V, then–
(A) Velocity of A is more than B at the ground
(B) Velocity of B is more than A at the ground
(C) Both A and B strike the ground with same velocity
(D) None of these

35 A man getting down a running bus, falls forward because.
(A) due to inertia of rest, road is left behind and man reaches forward
(B) due to inertia of motion upper part of body continues to be in motion in forward direction while feet come to rest as soon as they touch the road
(C) he leans forward as a matter of habit
(D) of the combined effect of all the three factors started in (a), (b) and (c)

36 A force 10N acts on a body of mass 20 kg for 10 sec. Change in its momentum is.
(A) 5 kg m/s

(B) 100 kg m/s

(C) 200 kg m/s

(D) 1000 kg m/s

---

37 Swimming is possible on account of

(A) first law of motion

(B) second law of motion

(C) third law of motion

(D) newton's law of gravitation

---

38 What is the sign of the work done by gravity on an man standing on a platform ?

(A) Zero

(B) Positive

(C) Negative

(D) Depends on the particular situation

---

39 A body at rest can have-

(A) speed

(B) energy

(C) momentum

(D) velocity

---

40 A shell following a parabolic path explodes somewhere in its flight. The centre of mass of fragements will continue to move in

(A) vertical direction

(B) any direction

(C) horizontal direction

(D) same parabolic path

---

41 Two particles of mass m 1 and m2 (m1 > m2) attract each other with a force inversely proportional to the square of the distance between them. If the particles are initially held at rest and then released, the centre of mass will

(A) move towards m1

(B) move towards m2

(C) remains at rest

(D) None of these

---

42 In which case application of angular velocity is useful ?

(A) When a body is rotating

(B) when a velocity of body is in a straight line

(C) When acceleration of body is in a straight line

(D) None of these

---

43 S.I. Unit of G is

(A) m s^{-2}

(B) N m^2 kg^{-2}

(C) No unit

(D) None of these

---

44 Two particles are placed at some distance, If the mass of each of the two particles is doubled, keeping the distance between them unchanged, the value of gravitational force between them will be

(A) $\frac{1}{4}$ times

(B) 4 times

(C) $\frac{1}{2}$ times

(D) unchanged

---

45 The weight of an object at the centre of the earth of radius R is

(A) zero

(B) infinite

(C) Rtimes the weight at the surface of the earth

(D) $1/R^2$ times the weight at surface of the earth

46 Value of G is

(A) 9.8 m s–2

(B) 6.673 × 10–11 N m^2 kg^{-2}

(C) 6.673 N

(D) 9.8 N

47 Young's modulus is defined as

(A) the ratio of linear strain to the normal stress

(B) the ratio of normal stress to strain

(C) product of linear strain and normal stress

(D) square of the ratio of normal stress to linear strain

48 Which of the following substance has the highest elasticity ?

(A) Steel

(B) Copper

(C) Rubber

(D) Sponge

49 Shearing strain is expressed by

(A) angle of shear

(B) angle of twist

(C) decrease in volume

(D) increase in volume

50 Human ears can sense sound waves travelling in air having wavelength of

(A) 10–3 m

(B) 10–2 m

(C) 1m

(D) 10^2 m

51 Which of the following statements is wrong ?

(A) Sound travels in straight line

(B) Sound is form of energy

(C) Sound travels in the forms of waves

(D) Sound travels faster in vacuum than in air

52 Voice of a friend is recognised by its

(A) pitch

(B) quality

(C) intensity

(D) velocity

53 Heat is transmitted from higher to lower temperature through actual mass motion of the molecules in

(A) conduction

(B) convection

(C) radiation

(D) None of these

54 The spectrum from a black body radiation is

(A) line spectrum

(B) band spectrum

(C) continuous spectrum

(D) line and band spectrum

55 A polished metal plate with a rough black spot on it is heated to abated 1400 K and quickly taken balck taken into a dark room. Which one ofthe following statements will be true ?

(A) The spot will appear brighter than the plate

(B) The spot will appear darker than the plate

(C) The spot and plate will appear equally bright

(D) The spot and the plate will not be visible in the dark

56 The wavelength of radiation emitted by a body depends upon

(A) the natur of its surface

(B) the area of its surface

(C) the temperature of its surface

(D) All of the above

57 The fastest mode of transfer of heat is

(A) conduction

(B) convection

(C) radiation

(D) None of these

58 The reciprocal of the combined resistance of any number of resistances connected in parallel is equal to

(A) The sum of reciprocals of individiual resistances

(B) reciprocal of the product of individiual resistances

(C) reciprocal of sum of all the resistances

(D) None of the above

59 A current of 1 A is drawn by a filament of an electric bulb. Number of electrons passing through a cross–section of the filament in 16 seconds woulbd be roughly

(A) 1020

(B) 1016

(C) 1018

(D) 1023

60 Which of the following represents voltage ?

(A) $\frac{\text{Work done}}{\text{Current} \times \text{time}}$

(B) Work done × Charge

(C) $\frac{\text{Work done} \times \text{Time}}{\text{Current}}$

(D) Work done × Charge × Time

61 If the current I through a resistor is increased by 100% (assume that temperature remains unchanged, the increase in power dissipated will be

(A) 100%

(B) 200%

(C) 300%

(D) 400%

62 When two or more resistors are connected in parallel,

(A) The current passing through each resistor is same

(B) The potential difference across each resistor is same

(C) Both of the above

(D) None of the above

63 An object placed at 2F of a convex lens will produce an image

(A) at 2F

(B) same size

(C) real and inverted

(D) All of these

64 An object placed between F and 2F of a convex lens will produce an image

(A) beyond 2F

(B) enlarged

(C) real and inverted

(D) All of these

65 A swimming pool looks shallower than it really is, when seen by a person standing outside near it, because of the phenomenon of

(A) refraction of light

(B) reflection of light

(C) dispersion of light

(D) None of these

66 In the extraction of some metals from their ores, coke can be used as a/an.....

(A) oxidizing agent

(B) reducing agent

(C) catalyst

(D) flux

67 ..... are used to produce energy in OTEC .

(A) Tidal energy

(B) Temperature difference between the different layers of water in ocean

(C) Ocean waves

(D) None of the above

68 A photon will have less energy, if its

(A) amplitude is higher

(B) frequency is higher

(C) wavelength is longer

(D) wavelength is shorter

69 A photoelectric cell converts

(A) light energy into heat energy

(B) light energy to sound energy

(C) light energy into electric energy

(D) electric energy into light energy

70 Light of a particular frequency v is incident on a metal surface. When the intensity of incident radiation is increased, the photoelectric current

(A) decreases

(B) increases

(C) remain unchanged

(D) sometimes increases and sometimes decreases

71 Which one of the following substances is used in the manufacture of safety matches ?

(A) Red phosphorus

(B) White phosphorus

(C) Phosphorus trioxide (P_2O_3)

(D) Black phosphorus

72 Which one of the following polymeric materials is used for making bullet proof jacket ?

(A) Nylon –6, 6
(B) Rayon **(C)**
Kevlar **(D)**
Dacron

73 Non–reacting gases have a tendency to mix with each other. This phenomenon is known as.
(A) chemical reaction
(B) diffusion
(C) effusion
(D) explosion

74 Alkali halids do not show Frenkel defect because
(A) cations and anions have almost equal size
(B) there is a large difference in size of cations and anions
(C) cations and anions have low coordination number
(D) anions cannot be accommodated in voids

75 In NaCl structure
(A) all octahedral and tetrahedral sites are occupied
(B) only octahedral sites are occupied
(C) only tetrahedral sites are occupied
(D) neither octahedral nor tetrahedral sites are occupied

76 A mixture of ZnCl 2 and PbCl2 can be separated by.
(A) distillation
(B) crystallization
(C) sublimation
(D) adding acetic acid

77 Age of fossil may be found out by determining the ratio of two isotopes of carbon. The isotopes are.
(A) C–12 and C–13
(B) C–13 and C–14
(C) C–12 and C–14
(D) C–12 and carbon black

78 Which of the following radioactive substances enters/ enter the human body through food chain and causes/cause many physiological disorders ?
(A) Strontium–90
(B) Iodine – 131
(C) Cesium – 137
(D) All of the above

79 Rutherford's alpha–particle scattering experiment was responsible for the discovery of.
(A) Electron
(B) Proton
(C) Nucleus
(D) Helium

80 The species that has the same number of electrons as is.
(A) $^{35}_{16}S$
(B) $^{34}_{16}S^{+}$
(C) $^{40}_{18}Ar^{+}$

(D) $^{35}_{17}S^{2-}$

81 Who developed long form of the periodic table ?

(A) Lothar Meyer

(B) Neils Bohr

(C) Mendeleev

(D) Moseley

82 Which of the scientists given below discovered that periodic table should be based on the atomic number ?

(A) Mendeleev

(B) Newlands

(C) Moseley

(D) Lothar Meyer

83 Which of the following is non–metallic ?

(A) B

(B) Be

(C) Mg

(D) Al

84 The only non–metal which is liquid at ordinary temperature is

(A) Hg

(B) Br_2

(C) NH_3

(D) None of these

85 Which one of the following statements is correct ?

(A) The oxidation number for hydrogen is always zero

(B) The oxidation number for hydrogen is always +1

(C) The oxidation number for hydrogen is always –1

(D) Hydrogen can have more than one oxidation number

86 Which one of the following elements is least reactive with water ?

(A) Lithium

(B) Sodium

(C) Potassium

(D) Cesium

87 The ionization energy of hydrogen atom in the ground state is

(A) 13.6 MeV

(B) 13.6 eV

(C) 13.6 Joule

(D) Zero

88 Which one of the following gases is placed second in respect of abundance in the Earth's atmosphere ?

(A) Oxygen

(B) Hydrogen

(C) Nitrogen

(D) Carbon dioxide

89 Stung by hairs of nettle leaves causes burning pain. This is due to the injection of

(A) Acetic acid

(B) Methanoic acid

(C) Sulphuric acid

(D) Hydrochloric acid

90 The chemical formula of baking soda is

(A) $Na2CO3$

(B) $NaHCO_3$

(C) $CaCO_3$

(D) NaOH

91 Nerve agents are a class of

(A) phosphorus-containing organic chemicals

(B) sulphur-containing organic chemicals

(C) osmium-containing organic compounds

(D) radon-containing organic compounds

92 The principal use of hydrofluoric acid is

(A) in etching glass

(B) as a bleaching agent

(C) as an extremely strong oxidizing agent

(D) in the preparation of strong organic fluorine compounds

93 Which of the following metals burn with a white dazzing light, with oxygen ?

(A) Sodium

(B) Potassium

(C) Magnesium

(D) Aluminium

94 Aluminium is obtained by the electrolysis of pure $Al2O3$ dissolved in

(A) Bauxite

(B) Cryolite

(C) Feldspar

(D) Alumina

95 Zinc is

(A) non – metalleable

(B) Brittle

(C) ductile

(D) (a) and (b)

96 The only non–metal that has luster is

(A) Sulphur

(B) Phosphorus

(C) Silicon

(D) Iodine

97 A functional isomer of 1- butyne is

(A) 2-butyne

(B) 1-butene

(C) 2-butene

(D) 1, 3 - butadience

98 The compound $C4H10O$ can show

(A) metamerism

(B) functional isomerism

(C) position isomerism

(D) All of these

99 Which pair of isomerism is not possible together ?

(A) Ring-chain and functional

(B) Geometrical and optical

(C) Metamerism and functional

(D) Metamerism and chain

100 Purification of petroleum is carried out by

(A) fractional distillation

(B) steam distillation

(C) vacuum distillation

(D) simple distillation

Subject : Maths

101. If the matrix $A = \begin{bmatrix} 1 & 2 \\ -5 & 1 \end{bmatrix}$ and $A^{-1} = xA + yI$, when I is a unit matrix of order 2, then the value of $2x + 3y$ is

(A) $\frac{8}{11}$ (B) $\frac{4}{11}$

(C) $\frac{-8}{11}$ (D) $\frac{-4}{11}$

102. $\int \frac{x^2+1}{x(x^2-1)}\,dx =$

(A) $\log x(x^2-1) + c$, where c is a constant of integration.

(B) $\log\left(\frac{x^2-1}{x}\right) + c$, where c is a constant of integration.

(C) $\log(x^2-1) + c$, where c is a constant of integration.

(D) $\log\left(\frac{x^2+1}{x}\right) + c$, where c is a constant of integration.

103. Let $\overline{A}$ be a vector parallel to line of intersection of planes P_1 and P_2 through origin, P_1 is parallel to the vectors $2\hat{j}+3\hat{k}$ and $4\hat{j}-3\hat{k}$ and P_2 is parallel to $\hat{j}-\hat{k}$ and $3\hat{i}+3\hat{j}$, then the angle between $\overline{A}$ and $2\hat{i}+\hat{j}-2\hat{k}$ is

(A) $\frac{\pi}{3}$ (B) $\frac{\pi}{2}$

(C) $\frac{\pi}{6}$ (D) $\frac{3\pi}{4}$

104. Let PQR be a right angled isosceles triangle, right angled at P(2, 1). If the equation of the line QR is $2x + y = 3$, then the equation representing the pair of lines PQ and PR is

(A) $3x^2 - 3y^2 + 8xy + 20x + 10y + 25 = 0$

(B) $3x^2 - 3y^2 + 8xy - 20x - 10y + 25 = 0$

(C) $3x^2 - 3y^2 + 8xy + 10x + 15y + 20 = 0$

(D) $3x^2 - 3y^2 - 8xy - 10x - 15y - 20 = 0$

105. The derivative of f(tan x) w.r.t. g(sec x) at $x = \frac{\pi}{4}$ where $f'(1) = 2$ and $g'(\sqrt{2}) = 4$ is

(A) $\frac{1}{\sqrt{2}}$ (B) $\sqrt{2}$

(C) 1 (D) 0

106. If λ is the perpendicular distance of a point P on the circle $x^2 + y^2 + 2x + 2y - 3 = 0$, from the line $2x + y + 13 = 0$, then maximum possible value of λ is

(A) $2\sqrt{5}$ (B) $3\sqrt{5}$

(C) $4\sqrt{5}$ (D) $\sqrt{5}$

107. The integral

$$\int \frac{\sin^2 x \cos^2 x}{(\sin^5 x + \cos^3 x \sin^2 x + \sin^3 x \cos^2 x + \cos^5 x^2)} dx \text{ is}$$

(A) $\frac{1}{3(1+\tan^3 x)} + c$, where c is a constant of integration.

(B) $\frac{-1}{3(1+\tan^3 x)} + c$, where c is a constant of integration.

(C) $\frac{1}{1+\cot^3 x} + c$, where c is a constant of integration.

(D) $\frac{-1}{1+\cos^3 x} + c$, where c is a constant of integration.

108. If $\frac{dy}{dx} = y + 3$ and $y(0) = 2$, then $y(\log 2) =$

(A) 5 (B) 7

(C) 13 (D) –2

109. The solution set of $8\cos^2\theta + 14\cos\theta + 5 = 0$, in the interval $[0, 2\pi]$, is

(A) $\left\{\frac{\pi}{3}, \frac{2\pi}{3}\right\}$ (B) $\left\{\frac{\pi}{3}, \frac{4\pi}{3}\right\}$

(C) $\left\{\frac{2\pi}{3}, \frac{4\pi}{3}\right\}$ (D) $\left\{\frac{2\pi}{3}, \frac{5\pi}{3}\right\}$

110. The solution set of $8\cos^2\theta + 14\cos\theta + 5 = 0$, in the interval $[0, 2\pi]$, is

(A) $\left\{\frac{\pi}{3}, \frac{2\pi}{3}\right\}$ (B) $\left\{\frac{\pi}{3}, \frac{4\pi}{3}\right\}$

(C) $\left\{\frac{2\pi}{3}, \frac{4\pi}{3}\right\}$ (D) $\left\{\frac{2\pi}{3}, \frac{5\pi}{3}\right\}$

111. If T_n denotes the number of triangles which can be formed using the vertices of regular polygon of n sides and $T_{n+1} - T_n = 21$, then n =

(A) 5 (B) 7

(C) 6 (D) 4

112. If $g(x) = 1 + \sqrt{x}$ and $f(g(x)) = 3 + 2\sqrt{x} + x$, then $f(f(x))$ is

(A) $x^2 + 4x + 6$ (B) $x^4 + x^2 + 6$

(B) $x^2 + x + 6$ (D) $x^4 + 4x^2 + 6$

113. The function $f(x) = \sin^4 x + \cos^4 x$ is increasing in

(A) $0 < x < \frac{\pi}{8}$ (B) $\frac{\pi}{4} < x < \frac{\pi}{2}$

(C) $\frac{3\pi}{8} < x < \frac{5\pi}{8}$ (D) $\frac{5\pi}{8} < x < \frac{3\pi}{4}$

114. If the variance of the numbers $-1, 0, 1, k$ is 5, where $k > 0$, then k is equal to

(A) $2\sqrt{\frac{10}{3}}$ (B) $2\sqrt{6}$

(C) $4\sqrt{\frac{5}{3}}$ (D) $\sqrt{6}$

115. $\lim_{x\to 0} \frac{\cos 7x^\circ - \cos 2x^\circ}{x^2}$ is

(A) $\frac{-45}{2}\pi^2$ (B) $\frac{-45}{2}\pi$

(C) $\frac{-\pi^2}{1440}$ (D) $\frac{-\pi^2}{2880}$

116. If $\tan\theta = \frac{\sin\alpha - \cos\alpha}{\sin\alpha + \cos\alpha}$, $0 \le \alpha \le \frac{\pi}{2}$, then the value of $\cos 2\theta$ is

(A) $\cos 2\alpha$ (B) $\sin\alpha$

(C) $\cos\alpha$ (D) $\sin 2\alpha$

117. The contrapositive of "If x and y are integers such that xy is odd, then both x and y are odd" is

(A) If both x and y are odd integers, then xy is odd.

(B) If both x and y are even integers, then xy is even.

(C) If x or y is an odd integer, then xy is odd.

(D) If both x and y are not odd integers, then the product xy is not odd.

118. The decay rate of radio active material at any time t is proportional to its mass at that time. The mass is 27 grams when $t = 0$. After three hours it was found that 8 grams are left. Then the substance left after one more hour is

(A) $\frac{27}{8}$ grams (B) $\frac{81}{4}$ grams

(C) $\frac{16}{3}$ grams (D) $\frac{16}{9}$ grams

119. If $x = -1$ and $x = 2$ are extreme points of $f(x) = \alpha \log x + \beta x^2 + x$, α and β are constants, then the value of $\alpha^2 + 2\beta$ is

(A) -3 (B) 3

(C) $\frac{3}{2}$ (D) 5

120. $\bar{u}, \bar{v}, \bar{w}$ are three vectors such that $|\bar{u}| = 1$, $|\bar{v}| = 2$, $|\bar{w}| = 3$. If the projection of $\bar{v}$ along $\bar{u}$ is equal to projection of $\bar{w}$ along $\bar{u}$ and $\bar{v}, \bar{w}$ are perpendicular to each other, then $|\bar{u} - \bar{v} + \bar{w}| =$

(A) 4 (B) $\sqrt{7}$

(C) $\sqrt{14}$ (D) 2

121. $\int_0^4 |2x - 5|\,dx =$

(A) $\frac{13}{2}$ (B) $\frac{15}{2}$ (C) $\frac{17}{4}$ (D) $\frac{17}{2}$

122. The approximate value of $\sin(60^\circ\ 0'\ 10'')$ is (given that $\sqrt{3} = 1.732$, $1' = 0.0175^c$)

(A) 0.08660243 (B) 0.0008660243

(C) 0.8660243 (D) 0.008660243

123. The p.m.f of random variate X is

$$P(X) = \begin{cases} \frac{2x}{n(n-1)}, & x = 1, 2, 3, \ldots\ldots, n \\ 0, & \text{otherwise} \end{cases}$$

Then E(X) =

(A) $\frac{n+1}{3}$ (B) $\frac{2n+1}{3}$

(C) $\frac{n+2}{3}$ (D) $\frac{2n-1}{3}$

124. If the area of the triangle with vertices (1, 2, 0), (1, 0, 2) and (0, x , 1) is $\sqrt{6}$ square units, then the value of x is

(A) 1 (B) 2 (C) 3 (D) 4

125. The differential equation $\cos(x + y)\, dy = dx$ has the general solution given by

(A) $y = \sin(x + y) + c$, where c is a constant.

(B) $y = \tan(x + y) + c$, where c is a constant

(C) $y = \tan\left(\frac{x+y}{2}\right) + c$, where c is a constant

(D) $y = \frac{1}{2}\tan(x + y) + c$, where c is a constant

126. An experiment succeeds twice as often as it fails. Then the probability, that in the next 6 trials there will be atleast 4 successes, is

(A) $\frac{1}{729}$ (B) $\frac{496}{729}$

(B) $\frac{233}{729}$ (D) $\frac{491}{729}$

127. A plane is parallel to two lines whose direction ratios are 1, 0, –1 and –1, 1, 0 and it contains the point (1, 1, 1). If it cuts the co-ordinate axes at A, B, C then the volume of the tetrahedron OABC (in cubic units) is

(A) $\frac{9}{4}$ (B) $\frac{9}{2}$ (C) 9 (D) 27

128. The area of the region bounded by the curves $y = e^x$, $y = \log x$ and lines $x = 1$, $x = 2$ is

(A) $(e-1)^2$ sq. units

(B) $(e^2 - e + 1)$ sq. units

(C) $(e^2 - e + 1 - 2\log 2)$ sq. units

(D) $(e^2 + e - 2\log 2)$ sq. units

129. $y = (1 + x)(1 + x^2)(1 + x^4) \ldots\ldots\ldots (1 + x^{2n})$, then the value of $\frac{dy}{dx}$ at $x = 0$ is

(A) 0 (B) –1

(C) 1 (D) 2

130. A and B are independent events with $P(A) = \frac{1}{4}$ and $P(A \cup B) = 2P(B) - P(A)$, then P(B) is

(A) $\frac{1}{4}$ (B) $\frac{3}{5}$

(C) $\frac{2}{3}$ (D) $\frac{2}{5}$

131. If $a > 0$ and $z = \frac{(1+i)^2}{a+i}$, $(i = \sqrt{-1})$ has magnitude $\frac{2}{\sqrt{5}}$ then $\bar{z}$ is equal to

(A) $-\frac{2}{5}+\frac{4}{5}i$ (B) $\frac{2}{5}-\frac{4}{5}i$

(C) $-\frac{2}{5}-\frac{4}{5}i$ (D) $\frac{2}{5}+\frac{4}{5}i$

132. The angle between the tangents to the curves $y-2x^2$ and $x-2y^2$ at (1, 1) is

(A) $\tan^{-1}\left(\frac{15}{8}\right)$ (B) $\tan^{-1}\left(\frac{7}{8}\right)$

(C) $\tan^{-1}\left(\frac{3}{4}\right)$ (D) $\tan^{-1}\left(\frac{1}{4}\right)$

133. If $x = \operatorname{cosec}\left(\tan^{-1}\left(\cos\left(\cot^{-1}\left(\sec\left(\sin^{-1}a\right)\right)\right)\right)\right)$, $a \in [0, 1]$

(A) $x^2-a^2=3$ (B) x^2+a^2-3

(C) $x^2-a^2=2$ (D) $x^2+a^2=2$

134. The distance of the point P(–2, 4, –5) from the line $\frac{x+3}{3}=\frac{y-4}{5}=\frac{z+8}{6}$ is

(A) $\frac{\sqrt{37}}{10}$ (B) $\sqrt{\frac{37}{10}}$

(C) $\frac{37}{\sqrt{10}}$ (D) $\frac{37}{10}$

135. The value of $\sin(\cot^{-1}x)$ is

(A) $\frac{1}{\sqrt{1+x^2}}$ (B) $\sqrt{1+x^2}$

(C) $\frac{1}{x\sqrt{1+x^2}}$ (D) $x\sqrt{1+x^2}$

136. The values of a and b, so that the function

$$f(x)=\begin{cases} x+a\sqrt{2}\sin x, & 0\le x\le\frac{\pi}{4} \\ 2x\cot x+b, & \frac{\pi}{4}\le x\le\frac{\pi}{2} \\ a\cos 2x-b\sin x, & \frac{\pi}{2}<x\le\pi \end{cases}$$

is continuous for $0 \le x \le \pi$, are respectively given by

(A) $-\frac{\pi}{12},\frac{\pi}{6}$ (C) $-\frac{\pi}{6},-\frac{\pi}{12}$

(C) $\frac{\pi}{6},\frac{\pi}{12}$ (D) $\frac{\pi}{6},-\frac{\pi}{12}$

137. Two adjacent sides of a parallelogram ABCD are given by $\overline{AB}=2\hat{i}+10\hat{j}+11\hat{k}$ and $\overline{AD}=-\hat{i}+2\hat{j}+2\hat{k}$. The side AD is rotated by an acute angle α in the plane of parallelogram so that AD becomes AD'. If AD' makes a right angle with side AB, then the cosine of the angle α is given by

(A) $\frac{8}{9}$ (B) $\frac{\sqrt{17}}{9}$

(C) $\frac{1}{9}$ (D) $\frac{4\sqrt{5}}{9}$

138. $\int \frac{\operatorname{cosec} x\, dx}{\cos^2\left(1+\log\tan\frac{x}{2}\right)} =$

(A) $\tan\left(1+\log\left(\tan\frac{x}{2}\right)\right) + c$, where c is constant of integration

(B) $\tan\ (1 + \log(\tan\ x)) + c$, where c is constant of integration

(C) $\tan\left(\log\left(\tan\frac{x}{2}\right)\right)+c$, where c is constant of integration.

(D) $\tan\left(\tan\frac{x}{2}\right)+ c$, where c is constant of integration.

139. The co-ordinates of the points on the line $2x - y = 5$ which are the distance of 1 unit from the line $3x + 4y = 5$ are

(A) $\left(\frac{30}{11},\frac{-5}{11}\right),\left(\frac{20}{11},\frac{15}{11}\right)$

(B) $\left(\frac{-30}{11},\frac{5}{11}\right),\left(\frac{-20}{11},\frac{15}{11}\right)$

(C) $\left(\frac{30}{11},\frac{5}{11}\right),\left(\frac{20}{11},\frac{-15}{11}\right)$

(D) $\left(\frac{-30}{11},\frac{5}{11}\right),\left(\frac{-20}{11},\frac{-15}{11}\right)$

140. The centroid of tetrahedron with vertices at A(–1, 2, 3), B(3, –2, 1), C(2, 1, 3) and D(–1, –2, 4) is

(A) $\left(\frac{3}{4},\frac{-1}{4},\frac{11}{4}\right)$ (B) $\left(\frac{5}{4},\frac{-3}{4},\frac{7}{4}\right)$

(C) $\left(\frac{-3}{4},\frac{-1}{4},\frac{11}{4}\right)$ (D) $\left(\frac{-5}{4},\frac{-3}{4},\frac{-7}{4}\right)$

141. If $\log(x + y) = 2xy$, then $\frac{dy}{dx}$ at $x = 0$ is

(A) 1 (B) –1

(C) 2 (D) –2

142. Two cards are drawn successively with replacement from a well shuffled pack of 52 cards. Then the probability distribution of number of jacks is

(A)

X = x	0	1	2
P(X = x)	$\frac{144}{169}$	$\frac{24}{169}$	$\frac{1}{169}$

(B)

X = x	0	1	2
P(X = x)	$\frac{1}{169}$	$\frac{144}{169}$	$\frac{24}{169}$

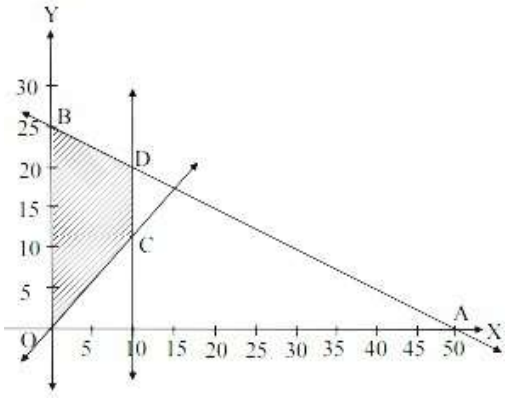
(C)

X = x	0	1	2
P(X = x)	$\frac{24}{169}$	$\frac{1}{169}$	$\frac{144}{169}$

(D)

X = x	0	1	2
P(X = x)	$\frac{144}{169}$	$\frac{1}{169}$	$\frac{24}{169}$

143. For a feasible region OCDBO given below, the maximum value of the objective function $z = 3x + 4y$ is



(A) 70 (B) 100
(C) 110 (D) 130

144. In a triangle, the sum of lengths of two sides is x and the product of the lengths of the same two sides is y. If $x^2 - c^2 = y$, where c is the length of the third side of the triangle, then the circumradius of the triangle is

(A) $\frac{c}{3}$ (B) $\frac{c}{\sqrt{3}}$

(C) $\frac{3}{2}y$ (D) $\frac{y}{\sqrt{3}}$

145. If $\int \cos^{\frac{1}{2}} x \cdot \sin^3 x \, dx = \frac{-1}{m}\cos^m x + \frac{1}{n}\cos^n x + c$, (where c is the constant of integration), then (m, n) –

(A) $\left(\frac{18}{5}, \frac{8}{5}\right)$ (B) $\left(\frac{-8}{5}, \frac{18}{5}\right)$

(C) $\left(\frac{8}{5}, \frac{18}{5}\right)$ (D) $\left(\frac{-18}{5}, \frac{-8}{5}\right)$

146. If $\bar{a}, \bar{b}, \bar{c}$ are three vectors, $|\bar{a}| = 2$, $|\bar{b}| = 4$, $|\bar{c}| = 1$, $|\bar{b} \times \bar{c}| = \sqrt{15}$ and $\bar{b} = 2\bar{c} + \lambda\bar{a}$, then the value of λ is

(A) 2 (B) $2\sqrt{2}$ (C) 1 (D) 4

147. A ladder 5 meters long rests against a vertical wall. If its top slides downwards at the rate of 10 cm/s, then the angle between the ladder and the floor is decreasing at the rate of _____ rad./s when it's lower end is 4 m away from the wall.

(A) –0.1 (B) –0.025
(C) 0.1 (D) 0.025

148. The equation of the plane through (–1, 1, 2) whose normal makes equal acute angles with co-ordinate axes is

(A) $x + y + z - 3 = 0$ (B) $x + y + z - 2 = 0$
(C) $x + y - z - 2 = 0$ (D) $x - y + z - 3 = 0$

149. The inverse of the statement "If the surface area increase, then the pressure decreases.", is

(A) If the surface area does not increase, then the pressure does not decrease.

(B) If the pressure decreases, then the surface area increases.

(C) If the pressure does not decreases, then the surface area does not increase.

(D) If the surface area does not increase, then the pressure decreases.

150. If general solution of $\cos^2\theta - 2\sin\theta + \frac{1}{4} = 0$ is $\theta = \frac{n\pi}{A} + (-1)^n \frac{\pi}{B}$, $n \in Z$, then A + B has the value

(A) 7 (B) 6 (C) 1 (D) –7

ANSWER KEY

1 C

2 D 3

A 4 B

5 A 6

A 7 A

8 B 9

C 10

D 11

D 12

D 13

A 14

C 15

A 16

A 17

D 18

A 19

D 20

C 21

A 22

D 23

C 24

C 25

C 26

D 27

D 28

B 29

B 30

C 31

A 32

B 33

D 34

C 35

B 36

B 37

C 38

A 39

B 40

D

41 C

42 A

43 B

44 B

45 A

46 B

47 B

48 A

49 A

50 C

51 D

52 B

53 B

54 C

55 A

56 D

57 C

58 A

59 A

60 A

61 C

62 B

63 C

64 C

65 A

66 B

67 B

68 C

69 C

70 B

71 A

72 C

73 C

74 A

75 B

76 B

77 C

78 D

79 C

80 C

81 B

82 C

83 A

84 B 85

D

86 A

87 B

88 A

89 B

90 B

91 A

92 A

93 C

94 B

95 D

96 D

97 D

98 D

99 C

100 A