Mock Test

SUBJECT: Physics/ Chemistry

1 : Anantennauseselectromagnetic waves of frequency 5 MHz . For proper working, the size of the antenna should be

(A) 300m
(B) 3km
(C) 15m
(D) 15km

2 : Theamountofenergyreleased when one microgram of matter is annihilated is

(A) 25 kWh
(B) 9×10^{10} kWh
(C) 3×10^{10} kWh
(D) 0.5×10^{5} kWh

3 : Thenumberofsignificantfigures in the numbers 4.8000 x 104 48000.50 are respectively

(A) 5 and 6
(B) 5 and 7
(C) 2 and 7
(D) 2 and 6

4 : ?-decaymeansemissionofelectron from

(A) innermost electron orbit
(B) a stable nucleus
(C) outermost electron orbit
(D) radioactive nucleus

5 : Anelectricheaterrated220V and 550 W is connected to AC mains. The current drawn by it is

(A) 0.8A
(B) 2.5A
(C) 0.4A
(D) 1.25 A

6 : Astringiswoundroundtherim of a mounted flywheel of mass 20 kg and radius 20 cm. A steady pull of 25 N is applied on the cord.Neglectingfrictionandmass of the string, the angular acceleration of the wheel is

(A) $50 s^{-2}$
(B) $25 s^{-2}$
(C) $12.5 s^{-2}$
(D) $6.25 s^{-2}$

7 : A billiards player hits a stationary ball by an identical ball to pocker the target ball in a corner pocket that is at an angle of 35o with respect to the direction of motion of the first ball. Assuming the collision as elastic and that frictional and rotational motions are not important, the angle made by the target ball with respect to the imcoming ball is

(A) 35o
50o
55o
(B) **(C)** **(D)**

60o

8 : Excess of Na+ ions in our system causes:

(A) High B.P.
(B) Low B.P.
(C) Diabetes
(D) Anaemia

9 : Which of the following is the most active chemically?

(A) Chlorine
(B) Flourine
(C) Lithium
(D) Iodine

10 : Which among the following is a Noble Gas?
(A) Nitrogen
(B) Hydrogen
(C) Oxygen
(D) Helium

11 : Which among the following is known as White Vitriol?
(A) Zinc Sulphate
(B) Zinc Chloride
(C) Zinc Phosphate
(D) Zinc oxide

12 : The oxidation number and the electronic configuration of sulphur in H 2SO4 is:
(A) + 4; 1s2 2s2 2p6 3s2
(B) +2; +6; 1s2 2s2 2p6 3s2 3p2
(C) +3; 1s2 2s2 2p6 3s2 3p1
(D) +6; 1s2 2s2 2p6

13 : The mass of 112 cm3 of CH_4 gas at STP is:
(A) 0.16 g
(B) 0.8 g
(C) 0.08 g
(D) 1.6 g

14 : The volume of water to be added to 100 cm3 of 0.5 N H_2SO_4 to get decinormal concentration is:
(A) 400 cm3
500 cm3
450 cm3
(B)

(C)
â€‹100 cm3
(D)

15 : Reactions that have standard free energy changes less than zero always have equilibrium constant equal to
(A) unity
(B) greater than unity
(C) less than unity
(D) zero

16 : In order to decompose 9g water 142.5 kJ heat is required. Hence the enthalpy of formation of water is:
(A) – 142.5 kJ
(B) + 142.5 kJ
(C) – 285 kJ
(D) + 285 kJ

17 : A quantity of PCl 5 was heated in a 10 dm^{3}vessel at 2500 C PCl5 (g) PCl3 (g) + Cl2 (g) At equilibrium the vessel contains 0.1 mole of PCl 5 and 0.2 mole of Cl2. The equilibrium constant of the reaction is:
(A) 0.05
(B) 0.02
(C) 0.025
(D) 0.04

18 : Which among the following species has the highest ionization potential?
(A) B

(B) Li
(C) Ne
(D) F

19 : Which one of the following metallic hydroxides does not dissolve in sodium hydroxide solution?
(A) $Zn(OH)_2$
(B) $Al(OH)_3$
(C) $Fe(OH)_3$
(D) $Pb(OH)_2$

20 : IUPAC name of K 3Fe(CN)6 is:
(A) Potassium ferricyanide
(B) Hexacyano ferrate (III)
(C) Potassium hexacyno ferrate (III)
(D) Potassium hexacyno ferrate (II)

21 : Unpleasant smell of carbylamines is obtained when chloroform and alcoholic KOH are heated with:
(A) Any aliphatic amine
(B) Any amine
(C) Any primary amine
(D) Any aromatic amine

22 : Which of the following is an aldohexose?
(A) Cellulose
(B) Sucrose
(C) Glucose
(D) Raffinose

23 : When a mixture of calcium acetate and calcium formate is dry distilled, the product formed as:
(A) Ethanal
(B) Butanone
(C) Methanal
(D) Acetophenone

24 : The test used for identifying peptide linkage in proteins is:
(A) Borsche’s test
(B) Molisch’s test
(C) Ninhydrin test
(D) Biuret test

25 : Which of the following is not used to distinguish ethane from ethane?
(A) Iodine in CCl_4
(B) Bromine in CCl_4
(C) Alkaline $KMnO_4$
(D) Ammonical Cu 2Cl2

26 : To get a n-type doped semiconductor, impurity to be added to silicon should have the following number of valence electrons:
(A) 1
(B) 3
(C) 5
(D) 2

27 : Solubility)s) of CaF 2 in terms of its solubility product is given a
(A) $s= (K_{sp})^{1/3}$
(B) $s= (K_{sp}/2)^{1/3}$

(C) $s = (K_{sp}/4)1/3$

(D) $s = (K_{sp}/2)1/2$

28 : Which of the following is derived physical quantity ?

(A) Mass

(B) Velocity

(C) Length

(D) Time

29 : What are the units of magnetic permeability ?

(A) Wb A–1 m–1

(B) Wb–1 Am

(C) Wb A m–1

(D) Wb A–1 m

30 : The dimensions of pressure gradient are

(A) [ML–2 T–2]

(B) [ML–2 T–1]

(C) [ML–1 T–1]

(D) [ML–1 T–2]

31 : If an object covers equal distances in equal intervals of time, it is said to be in

(A) Circular Motion

(B) Uniform Motion

(C) Oscillatory Motion

(D) Non– uniform Motion

32 : Average velocity of an object is obtained by.

(A) Dividing the total distance traveled b the total time taken

(B) Half of the sum of the initial velocity and the final velocity

(C) Both (a) and (b)

(D) None of the above

33 : Negative value of acceleration signifies.

(A) The velocity is increasing

(B) The velocity is decreasing

(C) The velocity remains the same

(D) The object comes to rest

34 : In distance–time graphs.

(A) Distance is taken along the X–axis

(B) Time is taken along the Y–axis

(C) Straight line indicates uniform motion

(D) Straight line indicates non–uniform motion

35 : A hockey player pushes the ball on the ground. It comes to rest after travelling certain distance because.

(A) the player stops pushing the ball

(B) no unbalanced force action on the wall

(C) the ball moves only when pushes

(D) the opposing force acts on the body

36 : The physical quantitiy which is the product of mass and velocity of a body is known as.

(A) inertia

(B) momentum

(C) force

(D) change in momentum

37 : Rate of change of momentum of an object in proportional to the.

(A) balanced force applied

(B) applied unbalanced force in the direction of the force

(C) time during which the force is applied

(D) All of these

38 : A block of weight W is pulled a distance l along a horizontal table the work done by the weight is.

(A) w l

(B) Zero

(C) wg l

(D) md/g

39 : Unit of energy is.

(A) same as the unit of work

(B) joule

(C) Both (a) and (b)

(D) Neither (a) nor (b)

40 : If the resultant of all external forces is zero, the velocity of centre of mass will be

(A) zero

(B) constant

(C) either (a) or (b)

(D) neither (a) nor (b)

41 : A stick is thrown in the air and lands on the ground at some distance from the thrower. The centre of mass of the stick will move along a parabolic path

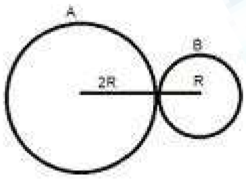
(A) in all cases

(B) only if the stick is uniform

(C) only if the stick has linear motion but no rotational motion

(D) only if the stick has a shape such that its centre of mass is located at some point on it and not outside it

42 : Two spheres A and B of masses m and 2 m and radii 2R and R respectively are placed in contact as shown. The COM of the system lies



(A) inside A

(B) inside B

(C) atthe point of contact

(D) None of these

43 : The weight of an object

(A) is the gravity of the matter it contains

(B) refers to its inertia

(C) is the same as its mass but expressed in different units

(D) is the force with which it is attracted to the earth

44 : At which of the following locations, the value of g is the largest ?

(A) On top of the Mount Everest

(B) On top of Qutub Minar

(C) At a place on the equator

(D) A camp site in Antarctica

45 : A ball is thrown vertically upwards. The acceleration due to gravity ?

(A) is in the direction opposite to the direction of its motion

(B) is in the same direction as the direction of its motion
(C) increases as it comes down
(D) becomes zero at the highes point

46 : Universal law of gravitation states that every object in the universe
(A) Attracts every other object with a force
(B) The force of attraction is proportional to the product of their masses
(C) The force is inversely proportional to the square of the distance between them
(D) All of these

47 : A rectangular tank of 6m long, 2 m broad and 2m deep is full of water, the thrust acting on the buttom of the tank is :
(A) 23.52 × 104 N
(B) 23.52 N
(C) 11.76 × 104N
(D) 3.92 × 104N

48 : Two stretched membranes of area 2 cm^2 and 3 cm^2 are placed in a liquid at the same depth. The ratio of the pressure on them is :
(A) 1 : 1
(B) 2 : 3
(C) 3 : 2
(D) $2^2 : 3^2$

49 : If upthrust U is equal to $\frac{1}{4}th$ the weight of the object in air, then the weight felt in the liquid is
(A) $\frac{1}{4}W$
(B) $\frac{3}{4}W$
(C) $\frac{1}{2}W$
(D) 2W

50 : One hertz is equivalent to
(A) one cycle per second
(B) one second
(C) one meter per second
(D) one second per meter

51 : Aparticle of the medium in contact with the vibrating object is first displaced particle and displaces it from rest. After displacing theadjacent particle the first particle
(A) Come back to its original position
(B) Goes and displaces the other particle
(C) Travels till the end of the medium
(D) None of these

52 : Ifyou are at open–air concert and someone's head gets between you and the orchestra, you can still hear the orchestra because
(A) sound waves pass easily through a head
(B) ahead is not very large compared with the wavelength of the sound
(C) the sound is reflected form the head
(D) the wavelength of the sound is much smaller than the head

53 : For a constant volume gas thermometer one shoulld fill the gas at
(A) low temperature and low pressure
(B) low temperature and high pressure
(C) high temperature and low pressure
(D) high temperature and high pressure

54 : When a gas is in thermal equilibrium, its molecules
(A) have the same average kinetic energy of molecules
(B) have different energies which remain constant
(C) have a certain constant energy
(D) do not collide with one another

55 : The pressure exerted on the walls of container by a gas is due to the fact that gas molecules are
(A) losing their kinetic energy
(B) sticking to the walls
(C) changing their momenta due to collision with the walls
(D) getting accelerated towards the wall

56 : Two identical rectangular strips, one of copper and the other of steel, are rivetted together to form a bimetallic strip (? copper > ?steel). On heating, this strip will
(A) remain straight
(B) bend with copper on convex side
(C) bend with steel on convex side
(D) get twisted

57 : On heating a liquid of coefficient of cubical expansion ? in a container having coefficient of linear expansion ?/3, the level of liquid in the container will
(A) rise
(B) fall
(C) remain almost stationary
(D) it is difficult to say

58 : Electric iron uses wires of alloy as
(A) they do not oxidise at high temperatures
(B) they do not burn at high temperatures
(C) both (a) and (b)
(D) neither (a) and (b)

59 : A student records that 36,000 joule of energy is used by him in an hour. The amount of electrical energy required to be used is
(A) 36 kW h
(B) 100 kW h
(C) 0.001 kW h
(D) 0.01 kW h

60 : To increase the resistance in a network, one has to connect any given resistor in
(A) parallel
(B) series
(C) can be (a) or (b)
(D) only (a)

61 : Heat produced due to flow of current through a conductor is given by the formula
(A) $H = I^2 Rt$
(B) $H = V I t$
(C) $H = V^2 t/R$
(D) All of the above

62 : A boy records that 4000 joule of work is required to transfer 10 coulomb of charge between two points of a resistor of 50?. The current pasing through it is
(A) 2A
(B) 4A
(C) 8A

(D) 16A

63 : An object placed at infinity of a concave mirror will produce an image

(A) at focus
(B) highly diminished
(C) real and inverted
(D) All of these

64 : Magnification produced by a rear view mirro fitted in vehicles

(A) is less than one
(B) is more than one
(C) is equal to one
(D) can be more than or less than one depending upon the position of the objective in front of it

65 : An object placed at F of a convex mirror will produce an image

(A) Behind the mirror
(B) Diminished
(C) Virtual and erect
(D) All of these

66 : Combustion, the process of burning a fuel, is ....
(A) an oxidation and an exothermic reaction .
(B) a reduction and an endothermic reaction .

(A) Only A is true
(B) Only B is true
(C) Only A and B are true
(D) Both A and B are false

67 .... is used as a fuel in space ships .

(A) Hydrogen
(B) Alcohol
(C) Petrol
(D) Diesel

68 : In case of electrons and photons having the same wavelength. What is same for them ?

(A) Energy
(B) Velocity
(C) Momentum
(D) Angular momentum

69 : The best metal to be used for photoemission is

(A) potassium
(B) sodium
(C) cesium
(D) lithium

70 : The photoelectrons emitted from a metal surface are such that their velocity

(A) is zero fo all
(B) is same fo all
(C) lies between zero and infinity
(D) lies between zero and a finite maximum

71 : Which of the following chemicals is used in foam fire extinguishers ?

(A) Aluminium sulphate
(B) Copper sulphate
(C) Cobalt sulphate
(D) Nickel sulphate

72 : What is a mixture of potassium nitrate, powdered charcoal and sulphur called ?
(A) Glass
(B) Cement
(C) paint
(D) Gun powder

73 : The size of colloidal particles usually lies in the range.
(A) 10–5 – 10–7 cm
(B) 10–7 – 10–9 cm
(C) 10–3 – 10–5 cm
(D) 10–5 – 10–6 cm

74 : Oil and water can form a stable dispersion with the help of a third substance commonly called.
(A) emulsifier
(B) dispersant
(C) protective colloid
(D) None of these

75 : Why is helium preferred over hydrogen for use in airships.
(A) Helium has a low density
(B) Helium has a high density
(C) Helium is chemically less reactive
(D) Helium is chemically more reactive

76 : Which one of the following mixture is homogeneous ?
(A) Starch and sugar
(B) Methanol and water
(C) Graphite and charcoal
(D) Calcium carbonate and calcium bicarbonate

77 : Which one among the following most correctly determines the atomic number of an element ?
(A) number of protons
(B) Number of protons and electrons
(C) Number of ions
(D) Number of nucleons

78 : The number of protons in a negatively charged atom (anion) is.
(A) more than the atomic number of the element
(B) less than the atomic number of the element
(C) more than the number of electrons in the atom
(D) less than the number of electrons in the atom

79 : Which one among the following is correct regarding 20Ne, 23Na+, 19F– and 24Mg^{2}+ ?
(A) They are isomers of each other
(B) They are isotopes of each other
(C) They are isoelectronic with each other
(D) All of the above

80 : Which formula gives the maximum number of electrons in a shell ?
(A) n^2
(B) $2n^2$
(C) $3n^2$
(D) $4n^2$

81 : Which of the following elements A, B, C, D and E with atomic number 3, 11, 15, 18 and 9 respectively belong to the same group ?

(A) A, B, C
(B) B, C, D
(C) A, D, E
(D) A, B, E

82 : Which of the following statement is not true about noble gases ?
(A) They are non–metallic in nature
(B) They exist in atomic form
(C) They are radioactive in nature
(D) Xenon is the most reactive among them

83 : Which among the following atoms has highest atomic radiation ?
(A) Na
(B) Rb
(C) K
(D) Cs

84 : Which one of these group of elements is also caled the hologen family ?
(A) Group 16
(B) Group 18
(C) Group 10
(D) Group 17

85 : In $KMnO_4$ molecule, the oxidation states of the elements Potassium (K), Manganese (Mn) and Oxygen (O) are respectively
(A) +1, +5, –2
(B) +1, +7, – 2
(C) 0, 0, 0
(D) +1, +7, 0

86 : In the reaction $4Fe + 3O_2 ? 4Fe^{3+} + 6O^{2-}$ Which of the following statement is incorrect ?
(A) It is a redox reaction
(B) Metallic iron acts as a reducing agent
(C) O_2 acts as an oxidising agent
(D) Metallic iron is reduced to Fe^{3+}

87 : Most of the explosions in mines occur due to the mixing of
(A) hydrogen with oxygen
(B) oxygen with acetylene
(C) Methane with air
(D) carbon dioxide with ethane

88 : If a limestone piece is dipped in water, a bubble evolves. The bubbling is due to
(A) hydrogen
(B) oxygen
(C) water vapour
(D) carbon dioxide

89 : Which one among the following is a double salt ?
(A) $K_4[Fe(CN)_6]$
(B) $K_2SO_4.Al_2(SO_4)_3.24H_2O$
(C) $CuSO_4.5H_2O$
(D) NaCl

90 : The pH of fresh ground water slightly decreases upon exposure to air because
(A) carbon dioxide from air is dissolved in the waer

(B) oxygen from air is dissolved in the water
(C) the dissolved carbon dioxide of the ground water escapes into air
(D) the dissolved oxygen of the ground water escapes into air

91 : Which one of the following is acidic ?
(A) Lemon juice
(B) Tomatoes
(C) Milk
(D) All

92 : Antacids are commonly used to get rid of acidity in the stomach. A commonly used antacid is
(A) sodium hydrogen phthalate
(B) magnesium hydroxide
(C) calcium hydroxide
(D) manganese acetate

93 : Non–metallic oxide are
(A) acidic
(B) basic
(C) neutral
(D) (a) and (c)

94 : Rusting of iron can be prevented by
(A) alloying
(B) painting
(C) galvanising
(D) All of these

95 : Which of the following is good conductors of heat and electricity ?
(A) Graphite
(B) Oxygen
(C) Chlorine
(D) Nitrogen

96 : Metals are
(A) malleable
(B) ductile
(C) None
(D) Both

97 : On the basis of following features identify the correct option
A. Drinks containing ethanol
B. These drinks are major source of income to government
(A) Alcoholic beverages
(B) Soft drinks
(C) Carbonated beverages
(D) Rectified spirit

98 : A bee-sting leaves an acid which cause pain an irritation. The injected acid is .
(A) acetic acid
(B) sulphuric acid
(C) citric acid
(D) methenoic acid

99 : 2- Pentene contains
(A) 15 ? and one π - bond
(B) 14 ?- and one π - bond

(C) 15 ?- and two π - bonds

(D) 14 ?- and two π - bonds

100 : Which are isomers ?

(A) ethyl alcohol and dimethyl ether

(B) acetone and acetaldehyde

(C) propionic acid and propanone

(D) methyl alcohol and dimethyl ether

SUBJECT: MATHS

101. Let X ~ B (n, p), if
$E(X) = 5$, $Var(X) = 2.5$ then $P(X < 1) =$

(A) $\left(\frac{1}{2}\right)^{11}$ (B) $\left(\frac{1}{2}\right)^{10}$

(C) $\left(\frac{1}{2}\right)^{6}$ (D) $\left(\frac{1}{2}\right)^{8}$

102. Derivative of $\tan^{-1}\left(\frac{x}{\sqrt{1-x^2}}\right)$ with respect to $\sin^{-1}(3x - 4x^3)$ is

(A) $\frac{1}{\sqrt{1-x^2}}$ (B) $\frac{3}{\sqrt{1-x^2}}$

(C) 3 (D) $\frac{1}{3}$

103. The differential equation of the family of circles touching Y-axis at the origin is

(A) $\left(x^2 + y^2\right)\frac{dy}{dx} - 2xy = 0$

(B) $x^2 - y^2 + 2xy\frac{dy}{dx} = 0$

(C) $\left(x^2 - y^2\right)\frac{dy}{dx} - 2xy = 0$

(D) $\left(x^2 + y^2\right)\frac{dy}{dx} + 2xy = 0$

104.
If $A = \begin{bmatrix} 1 & 1 & 0 \\ 2 & 1 & 5 \\ 1 & 2 & 1 \end{bmatrix}$, then

$a_{11} A_{21} + a_{12} A_{22} + a_{13} A_{23} =$

(A) 1 (B) 0 (C) −1 (D) 2

105. If Rolle's theorem for $f(x) = e^x(\sin x - \cos x)$ is verified on $\left[\frac{\pi}{4}, 5\frac{\pi}{4}\right]$ then the value of c is

(A) $\frac{\pi}{3}$ (B) $\frac{\pi}{2}$ (C) $3\frac{\pi}{4}$ (D) π

106. The joint equation of lines passing through the origin and trisecting the first quadrant is

(A) $x^2 + \sqrt{3}xy - y^2 = 0$

(B) $x^2 - \sqrt{3}xy - y^2 = 0$

(C) $\sqrt{3}x^2 - 4xy + \sqrt{3}y^2 = 0$

(D) $3x^2 - y^2 = 0$

107. If $2\tan^{-1}(\cos x) = \tan^{-1}(2\operatorname{cosec} x)$ then
$\sin x + \cos x =$

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

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

108. Direction cosines of the line $\frac{x+2}{2}=\frac{2y-5}{3}$, $z=-1$ are

(A) $\frac{4}{5},\frac{3}{5},0$ (B) $\frac{3}{5},\frac{4}{5},\frac{1}{5}$

(C) $-\frac{3}{5},\frac{4}{5},0$ (D) $\frac{4}{5},-\frac{2}{5},\frac{1}{5}$

109. $\int\frac{1}{\sqrt{8+2x-x^2}}dx=$

(A) $\frac{1}{3}\sin^{-1}\left(\frac{x-1}{3}\right)+c$

(B) $\sin^{-1}\left(\frac{x+1}{3}\right)+c$

(C) $\frac{1}{3}\sin^{-1}\left(\frac{x+1}{3}\right)+c$

(D) $\sin^{-1}\left(\frac{x-1}{3}\right)+c$

110. The approximate value of $f(x)=x^3+5x^2-7x+9$ at $x=1.1$ is

(A) 8.6 (B) 8.5 (C) 8.4 (D) 8.3

111. If r. v. X: waiting time in minutes for bus and p.d.f. of X is given by

$$f(x)=\begin{cases}\frac{1}{5}, & 0\le x\le 5\\ 0, & \text{otherwise,}\end{cases}$$

then probability of waiting time not more than 4 minutes is =

(A) 0.3 (B) 0.8 (C) 0.2 (D) 0.5

112. In ΔABC $(a-b)^2\cos^2\frac{C}{2}+(a+b)^2\sin^2\frac{C}{2}=$

(A) b^2 (B) c^2

(C) a^2 (D) $a^2+b^2+c^2$

113. Derivative of $\log(\sec\theta+\tan\theta)$ with respect to $\sec\theta$ at $\theta=\frac{\pi}{4}$ is

(A) 0 (B) 1 (C) $\frac{1}{\sqrt{2}}$ (D) $\sqrt{2}$

114. The joint equation of bisectors of angles between lines $x=5$ and $y=3$ is _______

(A) $(x-5)(y-3)=0$

(B) $x^2-y^2-10x+6y+16=0$

(C) $xy=0$

(D) $xy-5x-3y+15=0$

115. The point on the curve $6y = x^3 + 2$ at which y – co-ordinate is changing 8 times as fast as x – co-ordinate is ______

(A) (4, 11) (B) (4, –11)
(C) (–4, 11) (D) (–4, –11)

116. If the function f(x) defined by

$$f(x) = x\sin\frac{1}{x}, \quad \text{for } x \neq 0$$
$$= k, \quad \text{for } x = 0$$

is continuous at $x = 0$, then k =

(A) 0 (B) 1
(C) –1 (D) $\frac{1}{2}$

117. If $y = e^{m\sin^{-1}x}$ and $(1-x^2)\left(\frac{dy}{dx}\right)^2 = Ay^2$, then A=

(A) m (B) –m (C) m^2 (D) $-m^2$

118. $\int\left(\frac{4e^x - 25}{2e^x - 5}\right)dx = Ax + B\log\left|2e^x - 5\right| + c$, then

(A) A = 5, B = 3
(B) A = 5, B = –3
(C) A = –5, B = 3
(D) A = –5, B = –3

119. $$\frac{\tan^{-1}\left(\sqrt{3}\right) - \sec^{-1}(-2)}{\operatorname{cosec}^{-1}\left(-\sqrt{2}\right) + \cos^{-1}\left(-\frac{1}{2}\right)} =$$

(A) $\frac{4}{5}$ (B) $-\frac{4}{5}$
(C) $\frac{3}{5}$ (D) 0

120. For what value of k, the function defined by

$$f(x) = \frac{\log(1+2x)\sin x^\circ}{x^2}, \quad \text{for } x \neq 0$$
$$= k, \quad \text{for } x = 0$$

is continuous at $x = 0$?

(A) 2 (B) $\frac{1}{2}$
(C) $\frac{\pi}{90}$ (D) $\frac{90}{\pi}$

121. If $\log_{10}\left(\frac{x^2 - y^2}{x^2 + y^2}\right) = 2$, then $\frac{dy}{dx} =$

(A) $-\frac{99x}{101y}$ (B) $\frac{99x}{101y}$
(C) $-\frac{99y}{101x}$ (D) $\frac{99y}{101x}$

122. $\int_{\frac{-\pi}{2}}^{\frac{\pi}{2}} \log\left(\frac{2-\sin x}{2+\sin x}\right) dx =$

(A) 1 (B) 3 (C) 2 (D) 0

123. $\int \left(\frac{(x^2+2)a^{(x+\tan^{-1}x)}}{x^2+1}\right) dx =$

(A) $\log a . a^{x+\tan^{-1}x} + c$

(B) $\frac{(x+\tan^{-1}x)}{\log a} + c$

(C) $\frac{a^{x+\tan^{-1}x}}{\log a} + c$

(D) $\log a . (x+\tan^{-1}x) + c$

124. The degree and order of the differential equation $\left[1+\left(\frac{dy}{dx}\right)^3\right]^{\frac{7}{3}} = 7\left(\frac{d^2y}{dx^2}\right)$ respectively are

(A) 3 and 7 (B) 3 and 2
(C) 7 and 3 (D) 2 and 3

125. The acute angle between the line $\bar{r} = (\hat{i}+2\hat{j}+\hat{k}) + \lambda(\hat{i}+\hat{j}+\hat{k})$ and the plane $\bar{r}.(2\hat{i}-\hat{j}+\hat{k}) = 5$

(A) $\cos^{-1}\left(\frac{\sqrt{2}}{3}\right)$ (B) $\sin^{-1}\left(\frac{\sqrt{2}}{3}\right)$

(C) $\tan^{-1}\left(\frac{\sqrt{2}}{3}\right)$ (D) $\sin^{-1}\left(\frac{\sqrt{2}}{\sqrt{3}}\right)$

126. The area of the region bounded by the curve $y = 2x - x^2$ and X – axis is

(A) $\frac{2}{3}$sq.units (B) $\frac{4}{3}$sq.units

(C) $\frac{5}{3}$sq.units (D) $\frac{8}{3}$sq.units

127. If $\int \frac{f(x)}{\log(\sin x)} dx = \log(\log \sin x) + c$, then $f(x)=$

(A) $\cot x$ (B) $\tan x$
(C) $\sec x$ (D) $\operatorname{cosec} x$

128. If A and B are foot of perpendicular drawn from point Q (a, b, c) to the planes yz and zx, then equation of plane through the points A, B and O is ______

(A) $\frac{x}{a}+\frac{y}{b}-\frac{z}{c}=0$ (B) $\frac{x}{a}-\frac{y}{b}+\frac{z}{c}=0$

(C) $\frac{x}{a}-\frac{y}{b}-\frac{z}{c}=0$ (D) $\frac{x}{a}+\frac{y}{b}+\frac{z}{c}=0$

129. If $\bar{a} = \hat{i} + \hat{j} - 2\hat{k}$, $\bar{b} = 2\hat{i} - \hat{j} + \hat{k}$ and $\bar{c} = 3\hat{i} - \hat{k}$ and $\bar{c} = m\bar{a} + n\bar{b}$ then m + n = _______.

(A) 0 (B) 1

(C) 2 (D) –1

130. $$\int_0^{\frac{\pi}{2}} \left(\frac{\sqrt[n]{\sec x}}{\sqrt[n]{\sec x} + \sqrt[n]{\operatorname{cosec} x}} \right) dx =$$

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

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

131. If the p.d.f. of a r.v. X is given as

x_i	–2	–1	0	1	2
$P(X = x_i)$	0.2	0.3	0.15	0.25	0.1

Then F(0) =

(A) $P(X < 0)$ (B) $P(X > 0)$

(C) $1 - P(X > 0)$ (D) $1 - P(X < 0)$

132. The particular solution of the differential equation $y\ (1 + \log x)\frac{dx}{dy} - x \log x = 0$ when $x = e, y = e^2$ is

(A) $y = ex \log x$ (B) $ey = x \log x$

(C) $xy = e \log x$ (D) $y \log x = ex$

133. M and N are the midpoints of the diagonals AC and BD respectively of quadrilateral ABCD, then $\overline{AB} + \overline{AD} + \overline{CB} + \overline{CD} =$

(A) $2\,\overline{MN}$ (B) $2\,\overline{NM}$

(B) $4\,\overline{MN}$ (D) $4\,\overline{NM}$

134. If $\sin x$ is the integrating factor (I. F.) of the linear differential equation $\frac{dy}{dx} + Py = Q$, then P is

(A) $\log \sin x$ (B) $\cos x$

(C) $\tan x$ (D) $\cot x$

135. Which of the following equation does not represent a pair of lines ?

(A) $x^2 - x = 0$

(B) $xy - x = 0$

(C) $y^2 - x + 1 = 0$

(D) $xy + x + y + 1 = 0$

136. Probability of guessing correctly atleast 7 out of 10 answers in a "True" or "False" test is =

(A) $\frac{11}{64}$ (B) $\frac{11}{32}$

(C) $\frac{11}{16}$ (D) $\frac{27}{32}$

137. Principal solutions of the equation $\sin 2x + \cos 2x = 0$, where $\pi < x < 2\pi$ are

(A) $\frac{7\pi}{8}, \frac{11\pi}{8}$ (B) $\frac{9\pi}{8}, \frac{13\pi}{8}$

(C) $\frac{11\pi}{8}, \frac{15\pi}{8}$ (D) $\frac{15\pi}{8}, \frac{19\pi}{8}$

138. If line joining point A and B having position vectors $6\bar{a} - 4\bar{b} + 4\bar{c}$ and $-4\bar{c}$ respectively, and the line joining the points C and D having position vectors $-\bar{a} - 2\bar{b} - 3\bar{c}$ and $\bar{a} + 2\bar{b} - 5\bar{c}$ intersect, then their point of intersection is

(A) B (B) C

(C) D (D) A

139. If $A = \begin{bmatrix} 2 & 2 \\ -3 & 2 \end{bmatrix}$, $B = \begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix}$ then $(B^{-1} A^{-1})^{-1} =$

(A) $\begin{bmatrix} 2 & -2 \\ 2 & 3 \end{bmatrix}$ (B) $\begin{bmatrix} 2 & 2 \\ -2 & 3 \end{bmatrix}$

(C) $\begin{bmatrix} 2 & -3 \\ 2 & 2 \end{bmatrix}$ (D) $\begin{bmatrix} 1 & -1 \\ -2 & 3 \end{bmatrix}$

140. If p : Every square is a rectangle
q : Every rhombus is a kite then truth values of $p \rightarrow q$ and $p \leftrightarrow q$ are _______ and _______ respectively.

(A) F, F (B) T, F

(C) F, T (D) T, T

141. If $G(\bar{g})$, $H(\bar{h})$ and $P(\bar{p})$ are centroid, orthocenter and circumcenter of a triangle and $x\bar{p} + y\bar{h} + z\bar{g} = 0$ then $(x, y, z) =$

(A) 1, 1, –2 (B) 2, 1, –3

(C) 1, 3, –4 (D) 2, 3, –5

142. Which of the following quantified statement is true ?

(A) The square of every real number is positive

(B) There exists a real number whose square is negative

(C) There exists a real number whose square is not positive

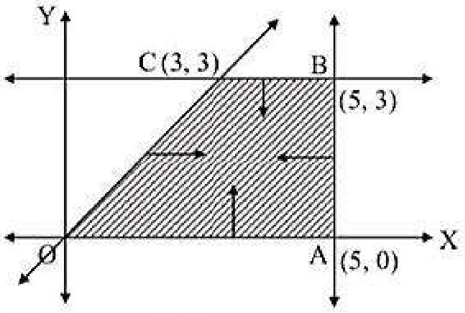
(D) Every real number is rational

143. The general solution of the equation $\tan^2 x = 1$ is

(A) $n\pi + \frac{\pi}{4}$ (B) $n\pi - \frac{\pi}{4}$

(C) $n\pi \pm \frac{\pi}{4}$ (D) $2n\pi \pm \frac{\pi}{4}$

144. The shaded part of given figure indicates the feasible region



then the constraints are

(A) $x, y \geq 0, x + y \geq 0, x \geq 5, y \leq 3$
(B) $x, y \geq 0, x - y \geq 0, x \leq 5, y \leq 3$
(C) $x, y \geq 0, x - y \geq 0, x \leq 5, y \geq 3$
(D) $x, y \geq 0, x - y \leq 0, x \leq 5, y \leq 3$

145. Direction ratios of the line which is perpendicular to the lines with direction ratios $-1, 2, 2$ and $0, 2, 1$ are

(A) 1, 1, 2 (B) 2, −1, 2
(C) − 2, 1, 2 (D) 2, 1, −2

146. If Matrix $A = \begin{bmatrix} 1 & 2 \\ 4 & 3 \end{bmatrix}$ such that $Ax = I$, then $x =$

(A) $\frac{1}{5}\begin{bmatrix} 1 & 3 \\ 2 & -1 \end{bmatrix}$ (B) $\frac{1}{5}\begin{bmatrix} 4 & 2 \\ 4 & -1 \end{bmatrix}$

(C) $\frac{1}{5}\begin{bmatrix} -3 & 2 \\ 4 & -1 \end{bmatrix}$ (D) $\frac{1}{5}\begin{bmatrix} -1 & 2 \\ -1 & 4 \end{bmatrix}$

147. If $\bar{a} = \hat{i} + \hat{j} + \hat{k}$, $\bar{b} = 2\hat{i} + \lambda\hat{j} + \hat{k}$, $\bar{c} = \hat{i} - \hat{j} + 4\hat{k}$ and $\bar{a}.(\bar{b} \times \bar{c}) = 10$, then λ is equal to

(A) 6 (B) 7
(C) 9 (D) 10

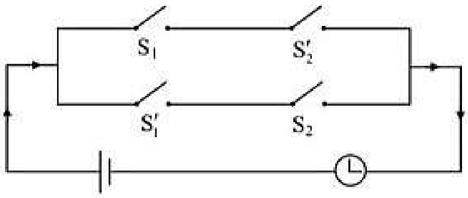
148. If r.v. $X \sim B\left(n = 5, P = \frac{1}{3}\right)$ then $P(2 < X < 4) =$

(A) $\frac{80}{243}$ (B) $\frac{40}{243}$

(C) $\frac{40}{343}$ (D) $\frac{80}{343}$

149. The objective function $z = x_1 + x_2$, subject to $x_1 + x_2 \leq 10$, $-2x_1 + 3x_2 \leq 15$, $x_1 \leq 6$, $x_1, x_2 \geq 0$ has maximum value _______ of the feasible region.

(A) at only one point
(B) at only two point
(C) at every point of the segment joining two points
(D) at every point of the line joining two points

150. 

Symbolic form of the given switching circuit is equivalent to ________

(A) $p \vee \sim q$ (B) $p \wedge \sim q$
(C) $p \leftrightarrow q$ (D) $\sim(p \leftrightarrow q)$

ANSWER KEY

1 : C
2 : A
3 : B
4 : D
5 : B
6 : D
7 : C
8 : A
9 : B
10 : D
11 : A
12 : D
13 : C
14 : A
15 : B
16 : C
17 : D
18 : C
19 : C
20 : C
21 : C
22 : C
23 : A
24 : D
25 : D
26 : A
27 : C
28 : B
29 : A
30 : A
31 : B
32 : B
33 : B
34 : C
35 : D
36 : B
37 : B
38 : B
39 : C
40 : C

41 : A

42 : C

43 : D

44 : D

45 : A

46 : D

47 : A

48 : A

49 : B

50 : A

51 : A

52 : B

53 : C

54 : A

55 : C

56 : B

57 : C

58 : C

59 : D

60 : B

61 : D

62 : C

63 : D

64 : A

65 : D

66 : A

67 : A

68 : C

69 : C

70 : D

71 : A

72 : D

73 : A

74 : A

75 : C

76 : B

77 : A

78 : D

79 : C

80 : B

81 : D

82 : C

83 : D

84 : D

85 : B

86 : D

87 : B

88 : D

89 : B

90 : A

91 : D

92 : B

93 : D

94 : D

95 : A

96 : D

97 : A

98 : D

99 : B

100 : A

101. b

102. d

103. b

104. b

105. d

106. c

107. b

108. a

109. d

110. a

111. b

112. b

113. b

114. b

115. a

116. a

117. c

118. b

119. b

120. c

121. a

122. d

123. c

124. b

125. b

126. b

127. a

128. a

129. c

130. c

131. c

132. a

133. c

134. d

135. c

136. a

137. c

138. a

139. a

140. d

141. b

142. c

143. c

144. b

145. b

146. c

147. a

148. b

149. c

150. d