collegebatch.com

click to campus

IPU CET 2012 Question Paper

Indraprastha University Common Entrance Test (IPU CET)

GGSIPU Physics 2012

1. A plane electromagnetic wave travels in vaccum along $\hat{k}$ direction, where $\hat{i}, \hat{j}$ and $\hat{k}$ are unit vectors along the x,y and z directions. The direction along which the electric and the magnetic field vectors point may be respectively

a $\hat{i}$ and $\hat{j}$ (b $\hat{i}$ and $-\hat{j}$

c $\hat{j}$ and $\hat{i}$ (d $\hat{k}$ and $\hat{i}$

2. In the order of increasing frequency, the electromagnetic spectrum may be arrabged as

a gamma rays, X -rays, visible light, radio waves

b X -rays , gamma rays,visible light,radfio waves

c radio waves,visible light,X -rays,gamma rays

d radio waves,visible light,gamma rays,X -rays

3. Two coherent monochromatic light beams of intensities I and 9I are super imposed. The maximum and the minimum intensities of the resultant beam are

a 10 I and zero

b 10 I and 8 I

c 10 I and 4 I

d 16 I and 4 I

4. In a single slit diffraction pattern, the distance between the first maximum on the left and the first maximum on the right is 5 mm. The screen on which the diffraction parttern is displaced is at a distance of 80 cm from the slit. The wavelength is 6000 $\AA$. The slit width in mm is about

a 0.576 b 0.348

c 0.192 d 0.096

5. When a ray is incident on a medium of refractive index n at Brewster's angle, it gets

a totally reflected

b totally absorbed

c circularly polarized

d plane polarized

6. An object is placed at a distance of 30 cm from a concave mirror and its real image is formed at a distance of 30 cm from the mirror. The focal length of the mirror is

a 60 cm b 45 cm

c 30 cm d 15 cm

7. A converging lens has a focal length of 50 cm. The power of the lens is

a + 5 D b + 2 D

c + 0.5 D d - 0.5 D

8. A converging lens of focal length f is used as simple microscope. If the least distance of distinct version of the observer is D and the lens is held close to the eye, the magnifying power of the lens is

a D□2f b f/D

c $\frac{D}{f}$ - 1 d D/f

9. A thin convex lens of refractive index 1.5 has 20 cm focal length in air. If the ,lens is completely immersed in a liquid refractive index 1.6, its focal length will be

a -160 cm b -100 cm

c + 10 cm d + 100 cm

10. In Thomson's experiment to measure e/m of electron, the electric and the magnetic fields are

a in the same direction

b in the opposite direction

c at an angle of 45 ^{0} with each other

d perpendicular to each other

11. The photo cut-off voltage in an experiment was found to be 1.5 V. The work function for the material used in the experiment was 4.2 2V. The maximum kinetic energy for the photoelectrons that was emitted was

a 1.5 eV b 2.7 eV

c 4.2 eV d 5.7 eV

12. A photo cell is a device which

a absorbs light and produces a stream of electrons

b absorb a stream of electron and produces light

c converts protons into photons

d coverts photons into protons

13. The ground state energy of hydrogen atom is -13.6 eV. The kinetic energy of the electron in this state is

a 27.2 eV b 13.6 eV

c 6.8 eV d 3.4 eV

14. When an atom undergoes β-decay, its atomic number

a does not change b increases by 1

c decreases by 1 d increases by 2

15. A nucleus X initially at rest, undergoes alpha decay according to the equation

$$92^{X^A} \rightarrow z^{Y^{228}} + \alpha$$

Then,the values of A and Z are

a 94,230 b 232,90

c 190,32 d 230,94

16. The energy gap between the velence band and the conduction band for the material is

a an insultor

b a metal

c an intrinsic semiconductor

d a superconductor

17. An AC signal of 50 Hz frequency is input of a full wave rectifier using two diodes. The output frequency after full wave rectification is

a 25 Hz b 50 Hz

c 100 Hz d 200 Hz

18. In a transistor biased in the common-emitter mode the emitter current is

a much smaller than base current

b much larger than base current

c nearly equal to the base current

d much smaller than the collector current

19. When the inputs of a two input logic gate are 0 and 0, the output is 1.When the inputs are 1 and 0 the output is o. The logic gate is of the type

a AND b NAND c NOR d OR

20. The sun revolves around galaxy with speed of 250 km/s around the centre of milky way and its radius is $3x10^4$ light year. The mass of milky way in kg is

a $6x10^{41}$ b $5x10^{41}$

c $4x10^{41}$ d $3x10^{41}$

21. The dimensions of the quantity hv/c, where h is planck's constant, v is the frequency and c is the velocity of light is

a $[ML^{-1}]$ b $[MLT^{-1}]$

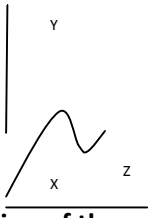
c $[MLT^{-2}]$ d $[ML^2T^2]$

22. The SI unit of the coefficient of viscosity is

a N $-m^2$ b N -s

c N $-s/m^2$ d N $-m^2/s$

23. A particle is constrained to move along a straight line. The graph in the adjoining figure shows the distance s moved by e particle in time t, measured from the starting time. The shape of the curve indicates that



a Acceleration of the rticle is increasing at X

b The speed of the particle is maximum at the point Z

c The speed of the particle X is greater than that Z

d The particle is at rest at the point Y

24. A bomb is fixed from a canon with a velocity of 1000 m/s making an angle of 30^0 with the horizontal g=9.8 m/s^2. Time taken by bomb to reach the highest point is

a 40 s b 30 S c 51 s d 25 s

25. A particle is acted upon by a force of constant magnitude which is always perpendicular to the velocity of the particle. The motion of the particle takes place in the plane.It follows that

a the speed of the particle is constant

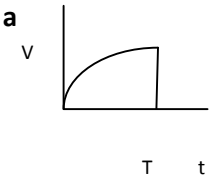
b the acceleration of the particle is constant

c the motion is that of a projectile

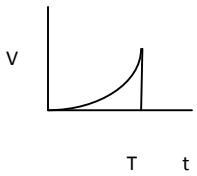
d the velocity of the particle is c onstant

26. A body is acted upon by a constant force from time t = 0 to a time t = T after which it does not experience any force. Which of the following graphs best represents the variation of the velocity of the body with time?

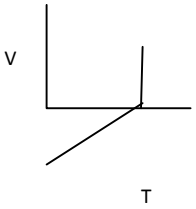
a



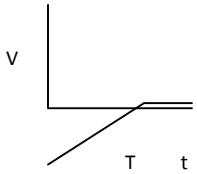
b



c



d



27. A satellite is in a circular orbit round the earth at an altitude R above the earth's surface, Where R is the redius of the earth. If g is the acceleration due to gravity of the earth the speed of the satellite is

a $\sqrt{2Rg}$ b $\sqrt{Rg}$

c $\sqrt{Rg/2}$ d $\sqrt{Rg/4}$

28. At the top of the trajectory of a projectile, thrown at an angle of projection $\theta < 90^0$, its

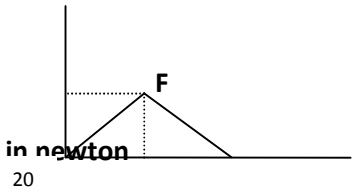
a velocity is z ero

b velocity is parallel to the direction of acceleration

c velocity is anti -parallel to the direction of acceleration

d velocity is perp endicular to the direction of acceleration

29. A body is initially at rest on a smooth surface.A force F, whose time variation is shown in the adjacent figure acts on it for a duration of 4 s. The momentum of the ball at the end of the 4 s is in N - s



a 10 b 20

c 30 d 40

30. Two satellites P and Q are in the same circular orbit round the earth. The mass of P is greater than that of Q. It follows that

a the second of P is equal to that of Q

b the speed of P is greater than that of Q

c the speed of P is less than that of Q

d the kinetic energy of P is equal to that of Q

31. A particle moving ,eastwards with a velocity of 5 m/s. In 10 s, its velocity changes to 5 m/s northwards. The average acceleration in this time is

a zero

b $\frac{1}{\sqrt{2}}$ m/s^2 towards north-west

c $\frac{1}{\sqrt{2}}$ m/s^2 towards north-east

d $\frac{1}{2}$ m/s^2 towards north-west

32. A particle moving in one dimension with a constant acceleration of 2 m/s^2 is observed to cover a distance of 5 m during a particular interval of 1 s. The distance covered by the particle in the next 1 s interval is in mettre

a 5 b 6

c 7 d 10

33. A body at rest is moved along a straight line by a machine which delivers constant power . The distance moved by the body in time t is proportional to

a $t^{1/2}$ b $t^{3/4}$

c t d $t^{3/2}$

34. Two bodies, A and B initially, at rest, move towards each other under mutual force of attraction. At the instant when the speed of A is ν and that of B is 2ν, the speed of the centre of mass of the bodies is

a 3 ν b 2 ν

c 1.5 ν d zero

35. A mass 3m, initially at rest at the origin, explodes into three fragments of equal mass. Two of the fragments have a speed ν each and move perpendicular to teach other.bThe third fragment will move with a speed

a $\nu/\sqrt{2}$ b $\nu/2$

b ν d $\sqrt{2}\nu$

36. A constant force F is pushing a 5 kg mass on a horizontal surface at a constant velocity of 2 m/s. The coefficient of friction between the surface and the mass is 0.3Take g = 10 m/s^2. If F acts along the direction of motion, the rate at which F is doing work in watt

a 3 b 6 c 10 d 30

37. The moment of inertia of a of a ring about of one its diameter is I. What will be its moment of inertia about a tangent parallel to the diameter is I. What will be its moment of inertia about a tangent parallel to the diameter?

a 44 b 2 I

c $\frac{3}{2}$I d 3 I

38. A massless spring of natural length of 0.5 m and spring constant 50 N/m has one end fixed and the other end attached to a mass of 250 g. The spring mass system is on a smooth floor. The mass is

pulled until the length of the spring is 0.6 and then released from rest. The kinetic energy of the mass when the length of trhe spring is o.5 m is

a 0.25 J b 2.25 J

c 6.25 J d 9 J

40. A thin disc is rotating with a constant angular velocity about its own axis. A is a point on the rim of the disc and B is a point half-way between the rim and the centre. The ratio of the velocity at A to that at B is

a 1:4 b 1:2

c 1:1 d 2:1

41. A simpler pendulum has a time period of 1 s. in order to increase the time period to 2 s

a the mass of the bob should be doubled

b the length of the pendulum should be doubled

c the length of the pendulum should be increased by a factor of 4

d the length of the pendulum should be decreased by a factor of 4

42. The amplitude of a particle executing simple harmonic motion with a frequency of 60 Hz is 0.01 m. The maximum value of acceleration of the particle is

a 144 π^2 m/s^2 b 12 m/s ^{2}

c 11 m/s ^{2} d 169 m/s ^{2}

43. Standing waves are formed on a string when interference occurs between two waves having

a the same amplitu de travelling in the same direction with no phase difference between them

b the same amplitude, travelling in the opposite direction with no phase difference between them

c diff erent amplitudes travelling in the same direction

d different amplitudes travelling in the opposite direction

44. A 4 m long copper wire of cross-sectional area 1.2 cm^2 is stretched by a force of 4.8x10^3 N. Young's modules for copper Y = 1.2x10 ^{11} N/m^2 the increase in length of wire is

a 1.32 mm b 0.8 mm

c 0.48 mm d 5.36 mm

45. A stationary police car sounds a siren with a frequency of 990 Hz. If the speed of sound is 330 m/s,will hear a frequency of

a 891 Hz b 900 Hz

c 1089 Hz d 1100 Hz

46. The pressure required to stop the increase in volume of a copper block when it is heated from 50^0 C to 70^0 C. Coefficient of linear expansion of copper is $8x10^{-6}$ /^{0}C and bulk modules of eaasticity = $3.6x10^{11}$ N/m^2, is

a $2.8x10^5$ N/m^2

b $1.72x10^{8}$ N/m^2

c $6.3x10^{3}$ N/m^2

d $8x10^{-6}$ N/m^2

47. Given that the surface tension of water is 75 dyne/cm, its density 1 g/cc and angle of contact zero, the height to which water rises in a capillary tube of 1 mm diameter is take g = 10 m/s ^{2}

a 9.0 cm b 7.5 cm

c 6.0 cm d 3.0 cm

48. An open tank filled with water density ρ has a narrow hole at a depth of h below the water flowing out is

a hhρg b 2 gh

c $\sqrt{2gh}$ d gh

49. A heat engine undergoes a process in which its internal energy decrease by 400 J and it gives out 150 J of heat. During the process

a it does 250 J of work and its temperature rises

b it does 250 J of work and its temperature falls

c it does 550 J of work and its temperature rises

d it does 550 J of work and its temper ature falls

50. An ideal gas heat engine operates in carnot cycle between 227^0 C and 127^0C. It absorbs $6x10^4$ cal of heat at higher temperature.Amount of heat converted into work,is

a 1.2x10 ^{4} cal

b 2.4x10 ^{4}cal

c 6.0x10 ^{4} cal

d 4.8x10 ^{4} cal

GGSIPU chemistry 2012

1. Which of the following compound is found most abundantly in nature?

   a Fructose b Glucose

   c Starch d Cellulose

2. Gabriel synthesis is used for synthesis of

   a primary amines b secondary amines

   c aldehydes d acids

3. Glycerol is

   a 1,3 -dihydroxy propane

   b 2,3 -digydroxy propanone

   c 2,3 -dihydroxy propane

   d 1,2,3 -propane triol

4. Propanal on reaction with dilute sodium hydroxide forms

   a $CH_3CH_2CH_2CH_2CHO$

   b $CH_3CH_2CHOH)\ CH_2CH_2CHO$

   c $CH_3CH_2CH_2CH(OH)CH_2CHO$

   d $CH_3CH_2CH(OH)CH(CH_3CHO$

5. Complete combustion of 0.858 g of compound X gives 2.63 g of CO_2 and 1.28 g of H_2O.The lowest molecular weight which X can have, is

   a 43 g b 86 g

   c 129 g d 172 g

6. What structural feature distinguishes glycine form other natural α-aminoacids?

   a It is optically inactive

   b it contains aromatic group

   c It is a dicarboxylic acid

d It has a secondary amine

7. Soft drink and baby feeding bottles are generally made up of

a polyester b polyurethane

c polyurea d polystyrene

8. The product formed in the following reaction is $CH_3CH(CH_3CH = CH_2+HBr$

$\rightarrow$ product

a $CH_3{}_2CHCH(BrCH_3$
b $CH_3{}_2CHCH_2CH_2Br$
c $CH_3{}_2CBrCH{}_2CH_3$
d $CH_3CH(CH_3CHBrCH{}_2CH_3$

9. How many isomers can C_5H_{12} have?

a 3 b 2

c 4 d 5

10. Which amino acid is achiral?

a Alanine b valine

c Proline d Glycine

11. When propyne is treated with dilute sulphuric acid in presence of mercury II sulphate, the major product is

a acetone b propene

c propanol d propanal

12. Reduction of carbonyl compounds with hydrazine in presence of strong base is called

a Cannizaro's reaction

b Clemmensen's reduction

c Wolf f-Kishner reduction

d Meerwein -Pondorf reduction

13. Which of the following is the most stable form of cyclohexane?

a Boat b Planar

c twist boat d Chair

14. What kind of bonding is responsible for the secondary structure of proteins

a Covalent bonding

b Hydrogen bonding

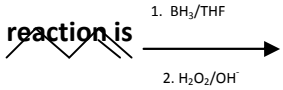
c Ionic bonding

d van der Waal's forces

15. The beta and alpha glucose have different specific rotations. When either is dissolved in water, their rotation changes until the same fixed value results. This is called

a epimerization b racemization

c anomerization d mutarotation

16. The product of following reaction is 

a pentanol b 2 -pentanol

c pentane d 1,2 -pentan-di-ol

17. Streptomycin is used as :

a antipyretic b mordant

c antibiotic d a ntihistamine

18. Which one of the following will be most basic ?

a Aniline b p -methoxyaniline

c p -nitroaniline d Benzylamine

19. Which of the following will exhibit highest boiling point?

a CH $_3CH_2OCH_2CH_3$

b CH $_3CH_2CH_2CH_2CH_2OH$

c CH $_3CH_2CH_2CH(CH_3OH$

d CH $_3CH_2CCH_3$ $_2OH$

20. Geomatrical isomerism is possible in case of

a 2 -butyne b 1 -butene

c propene d 2 -butene

21. n-butyl benzene on oxidation will give

a benzoic acid b butanoic acid

c benzyl alcohol d benzaldehyde

22. The element with electronic configuration of its atom $1s^2,2s^2,2p^6,3s^2,3p^6,3d^{10},4s^1$ is

a fe b Co c Ni d Cu

23. According to Bohr's theory the energy required for the transition of H atom from n = 6 to n=8 state is

a equal to the energy required for the transition from n=5 to n=7 state

b larger than in A

c less than in A

d equal to the energy required for the transition from n=7 to n=9 state

24. The dimensions of viscosity coefficient are

a $ML^{-1}T^{-1}$ b MLT^{-1}

c $ML^{-1}T$ d MLT

25. In the chemical reaction $2SO_2+O_2 \rightarrow 2SO_3$ increasing the total pressure leads to

a increase in amount of SO_3

b increase in partial pressure of O_2

c increase in the partial pressure of SO_2

d change in equilibrium constent

26. A 4p-orbital has

a one node b two nodes

c three nodes d four nodes

27. At the triple point of water the number of phases in equilibrium are

a zero b one

c two d three

28. The emf of a daniell cell at 298 K is E_1 $Zn/ZnSO_4$ 0.01 || $CuSO_4$ 1.0 M | Cu When the concentration of $ZnSO_4$ is 1.0 M and that of $CuSO_4$ is 0.01 M.The emf changed to E_2. Whatv is the relation between E_1 and E_2?

a $E_1 = E_2$ b $E_2 = 0 \neq E_1$

c $E_1 > E_2$ d $E_1 < E_2$

29. The correct order of ionization is

a Zn<Cd< Hg

b Na<Rb<Cs

c Rb<Cs<Na

d Cs<Rb<Na

30. The structure of $CH_2 = CH_2$ is

a linear

b planar

c non -planar

d has resonance structure

31. The hybridization of xenon in XeF_2 is

a sp^3 b sp^2

c sp^3d d sp^2d

32. The reagent commonly used to determine hardness of water titrimetrically is

a oxalic acid

b sodium citrate

c disodium salt of EDTA

d sodium carbonate

33. 0.01 N solution of KCL and $BaCL_2$ are prepared in water. The freezing points of KCL is found to be -2 ^{0}C. What is the freezing point of $BaCL_2$ solution assuming both KCL and $BaCL_2$ to be completely ionized?

a -3 ^{0}C b +3 ^{0}C

c -2 ^{0}C d -4 ^{0}C

34. 45 g of ethylene glycol is mixed with 600 g of water. What is the freezing point of the solution? $k_f = 1.86$ K kg mol^{-1}

a - 270.90 K

b 270.90 K

c 273 K

d 274.15 K

35. Which of the following used as a preservative for biological specimens

a Acetic acid

b Chloroform

c Formalin

d Formic acid

36. The charge required to deposit 9 g of AL from an AL^{3+} solution is

a 32166.3 C b 96500 C

c 3216.33 C d 9650 C

37. A compound formed by elements A and B crystallizes in the cubic arrangement in which A atoms are at the corners of a cube and B atoms are at the face centers. What is the formula of compound?

a AB_3 b B_3A

c A_2B_2 d AB_2

38. What is the pH value of M H_2SO_4?

a zero b One

c 2 d -0.3010

39. $F_2C = CF_2$ is a monomer of

a glyptal b Teflon

c orlon d buna -S

40. To an Ag_2CrO_4 solution over its own precipitate,CrO_4^{2-} ions are added. This results in

a increase in Ag^+ concentration

b decrease in concentration

c increase in the solubility product

d decrease in the solubility product

41. For a first order reaction, to obtain a positive slope,we need to plot {[A] is the concentration of reactant A}

a $\log_{10}$[A] vs t

b $-\log_e$[A] vs t

c $\log_{10}$ [A] vs log t

d [A] vs t

42. The species A in the reaction is

$_{92}U^{236} \rightarrow {}_{54}Xe^{144} + {}_{38}Sr^{90} + A$

a $_1H^1$ b $_0n^1$

c $_0n^1$ d 2 $_0n^1$

43. In Brownian movement or motion, the paths of the particle are

a linear b zig -zag

c uncertain d curved

44. The heats of adsorption in physisorption or physical adsorption lie in the range of in kj/mol

a 40 -400 b 40 -100

c 10 -40 d 200 -400

45. The reaction $2H_2O_2 \rightarrow 2H_2O+O_2$ is

a a redox reaction

b a hydrolysis reaction

c a solvolysis reaction

d disproportionation

46. The most abundant element in the earth's crust by weight is

a Si b AL c O d Fe

47. The most electropositive metals are isolated from their ores by

a high temperature reduction with carbon

b self -reduction

c thermal decomposition

d electrolysis of fused ionicsalts

48. The reaction of slaked lime with CL_2 gas gives

a only $CaOCL_2$

b only $CaCL_2$

c a mixture of $CaOCL_2$,$CaOH_2$,$CaCL_2$ and H_2O

d quick lime

49. The nitride saltr of Ca when treated with H_2O gives

a N_2 b CaO

c CaH_2 d NH_3

50. Correct formula of the comp[lex formed in the brown ring test for nitrates is

a $FeSO_4NO$

b $[FeH_2O_5NO]^{2+}$

c $[FeH_2O_5NO]^{+}$

d $[FeH_2O_5NO]^{3}$

GGSIPU mathmatics 2012

1. If the lines x-y-1=0, 4x+3y=k and 2x-3y+1=0 are concurrent, then k is

   a 1 b -1

   c 25 d 5

2. the number of common tangents to the circles $x^2+y^2 = 4$ and $x^2+y^2-8x+12 = 0$ is

   a 1 b 2 c 3 d 4

3. The centroid of a triangle formed by the points 0,0, cos θ,sin θ and sin θ, - cos θ lie on the line y = 2x; then θ is

   a $\tan^{-1} 2$ b $\tan^{-1}\frac{1}{3}$

   c $\tan^{-1}\frac{1}{2}$ d $\tan^{-1}$ -3

4. The orthoocentre of the triangle formed by 8,0 and 4,6 with the origin, is

   a 4, $\frac{8}{3}$) b 3, -4

   b 4,3 d 3,4

5. If the angle between two lines represented by $2x^2+5xy+3y^2+7y+4 = 0$ is $\tan^{-1}$ m, then m is equal to

   a $\frac{1}{5}$ b 1

   c $\frac{7}{5}$ d 7

6. If xy-4x+3y-λ = 0 represents the asymptotes of xy-4x+3y = 0, then λ is

   a 3 b -6 c 8 d 12

7. The equation of the chord of the parabola $y^2 = 8x$ which is bisected at the point 2, -3, is

   a 4x+3y+1 = 0

   b 3x+4y -1 = 0

   c 4x -3y-1 = 0

   d 3x -4y+1 =0

8. If x+y+1 = 0 touches the parabola $y^2 = \lambda x$, then λ is equal to

aa) 2 b 4 (c 6 d 8

9. The equations $x = \frac{e^t + e^{-t}}{2}$, $y = \frac{e^t - e^{-t}}{2}$ where t is real number, represents

a an ellipse b a parabola

c a hyperbola d a circle

10. if e_1 and e_2 are the eccentricities of two conics with $e_1^2 + e_2^2 = 3$, then the conics are

a ellipses b parabolas

c circles d hyperbolas

11. The sum of the distances of any point on the ellipse $3x^2+4y^2 = 24$ from its foci, is

a 8 $\sqrt{2}$ b 8

c 16 $\sqrt{2}$ d 4 $\sqrt{2}$

12. In $\triangle ABC$, if a tends to 2c and b tends to 3 c, then cos B tends to

a -1 b $\frac{1}{2}$ c $\frac{1}{3}$ d $\frac{2}{3}$

13. if sin $\pi \cos\theta = \cos \pi \sin\theta$,, then which of the following is correct

a cos $\theta = \frac{3}{2\sqrt{2}}$

b cos $\left(\theta - \frac{\pi}{2}\right) = \frac{1}{2\sqrt{2}}$

c cos $\left(\theta - \frac{\pi}{4}\right) = \frac{1}{2\sqrt{2}}$

d cos $\left(\theta + \frac{\pi}{4}\right) = -\frac{1}{2\sqrt{2}}$

14. The value of $\sin 12^0 \sin 48^0 \sin 54^0$ is equal to

a $\frac{2}{3}$ b $\frac{1}{2}$

(c) $\frac{1}{8}$ (d) $\frac{1}{3}$

15. If $3\sin^{-1}\left(\frac{2x}{1+x^2}\right) - 4\cos^{-1}\left(\frac{1-x^2}{1+x^2}\right) + 2\tan^{-1}\left(\frac{2x}{1-x^2}\right) = \frac{\pi}{3}$, then x is equal to

a $\frac{1}{\sqrt{3}}$ b $-\frac{1}{\sqrt{3}}$

c $\sqrt{3}$ ($-\frac{\sqrt{3}}{2}$

16. The shadow of a pole is $\sqrt{3}$ times longer. The angle of elevation is equal to

a 40^0 b $\frac{45^0}{2}$

c 60^0 d 30^0

17. The point of contact of the line x-y+2=0 with the parabola y^2-8x = 0 is

a 2,4 b -2,4

c 2, -4 d 2,2

18. If the sides of a triangle are x^2 +x+1, x^2-1 and 2x+1, then the greatest angle is

a 90^0 b 135^0 c 115^0 d 120^0

19. The value of cos 1^0. Cos 2^0. cos 3^0... cos 179^0 is equal to

a $\frac{1}{\sqrt{2}}$ b 0

c 1 d -1

20. If cot $\alpha+\beta = 0$, then sin $\alpha+2\beta$ is equal to

a sin α b cos α

c sin β d cos 2 β

21. The value of 4 sin A $\cos^3$ A – 4 cos A $\sin^3$ A is equal to

a cos 2A b sin 3A

c sin 2A d sin 4A

22. If the solutions for θ of cos of cos $p\theta$+cos $q\theta$ = 0, 0>q>0 arer in AP, then the numerically smallest common difference of AP is

a $\frac{\pi}{p+q}$ b $\frac{2\pi}{p+q}$

c $\frac{\pi}{2\ p+q)}$ d $\frac{1}{p+q}$

23. The value of k for which cos x + sin x ^{2}+ k sin x cos x -1 = 0 is that identity, is

a -1 b -2 c 0 d 1

24. If $4\cos^{-1}x + \sin^{-1}x = \pi$, then the value of x is

a $\frac{1}{2}$ b $\frac{1}{\sqrt{2}}$

c $\frac{\sqrt{3}}{2}$ d $\frac{2}{\sqrt{3}}$

25. a problem in mathematics is given to 3 students whose chances of solving individually are $\frac{1}{2}, \frac{1}{3}$ and $\frac{1}{4}$. The probability that the problem will be solved at least by one, is

a $\frac{1}{4}$ b $\frac{1}{24}$

c $\frac{23}{24}$ d $\frac{3}{4}$

26. In a non-leap year the probability of getting 53 Sundays or 53 Tuesdays or 53 Thursdays is

a $\frac{1}{7}$ b $\frac{2}{7}$

c $\frac{3}{7}$ d $\frac{4}{7}$

27. The probability for a randomly chosen month to have its 10^{th} day as Sunday, is

a $\frac{1}{84}$ b $\frac{10}{12}$

c $\frac{10}{84}$ d $\frac{1}{7}$

28. If the mean of numbers 27+x, 31+x, 89+x,107+x,156+x is 82, then the mean of 130+x,126+x,68+x,50+x,1+x is

a 79 b 157

c 82 d 75

29. if μ is the mean distributionof $\{Y_i, f_i\}$, then $\sum f_i(Y_i - \mu$ is equal to

a MD b SD

c 0 d relative frequency

30. Two cards are drawn successively with replacement from a well-shuffled pack of 52 cards. The probability of drawing two aces is

a $\frac{1}{13}$ b $\frac{1}{13} \times \frac{1}{17}$

c $\frac{1}{52} \times \frac{1}{51}$ d $\frac{1}{13} \times \frac{1}{13}$

31. If $\sec\left(\frac{x+y}{x-y}\right) = a$, then $\frac{dy}{dx}$ is

a $\frac{x}{y}$ b $\frac{y}{x}$

(c) y d x

32. If $x^y = e^{x-y}$, then $\frac{dy}{dx}$ is equal to

a $\frac{\log x}{1+\log x}$ (b) $\frac{\log x}{1-\log x}$

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

33. For y = cosm $\sin^{-1} x$ which of the following is true?

a 1 $-x^2 y_2 + xy_1 - m^2y = 0$

b 1 $-x^2 y_2 - xy_1 + m^2y = 0$

c $1+x^2 y_2 + xy_1 - m^2y = 0$

(c, ($-x^2) y_2 + xy_1 + m^2y = 0$

34. If f(x = $\begin{cases} x+1 & x \le 1 \\ 3-ax^2 & x > 1 \end{cases}$ is continuous at x =1, then the value of a is

a -1 b 2

(c) -3 (d)1

35. $\lim_{x\to\frac{\pi}{2}} \frac{a^{\cot x} - a^{\cos x}}{\cot x - \cos x}$ is equal to

a log a b log 2

c a a (d) log x

36. If f ' '0 = k, then $\lim_{x\to 0} \frac{2f(x) - 3f(2x) + f(4x)}{x^2}$ is equal to

a k b 2k c 3k d 4k) ...

37. If g is the inversefunction of f and f' x = $\frac{1}{1+x^n}$, then g'x is equal to

a $1+gx^n$ b 1 -gx

c 1+gx d 1 $-gx^n$

38. The curves $4x^2+9y^2 = 72$ and $x^2-y^2 = 5$ at 3,2

a touch each other b cut orthogonally

c interest at 45 ^{0} d interest at 60 ^{0}

39. The velocity ν m/s of a particle is proportional to the cube of the time. If the velocity after 2 s is 4m/s, then ν is equal to

a t t^3 b $\frac{t^3}{2}$

c $\frac{t^3}{3}$ d $\frac{t^3}{4}$

40. The minimum value of x log x is equal to

a e b $\frac{1}{e}$

c $-\frac{1}{e}$ d $\frac{2}{e}$

41. A particle moves along the x-axis so that its position is given $x = 2t^3 - 3t^2$ at a time t second. What is the time interval during which particle will be on the negative half of the axis?

a $0<t<\frac{2}{3}$ b $0<t<1$

c $0<t<\frac{3}{2}$ d $\frac{1}{2}<t<1$

42. A stone thrown vertically upwards satisfies the equations $s = 80t - 16t^2$. The time required to reach the maximum height is

a 2 s b 4 s

c 3 s d 2.5 s

43. If f(x+y = f(x, f(y, f(3 = 3, f'0 = 11. Then f'3 is equal to

a $11.e^{33}$ b 33

c 11 d lo g 33

44. If y = x tan y, then $\frac{dy}{dx}$ is equal to

a $\frac{\tan y}{x-x^2-y^2}$ (b $\frac{y}{x-x^2-y^2}$

c $\frac{\tan y}{y-x}$ d $\frac{\tan x}{x-y^2}$

45. The product of the lengths of subtangent and subnormal at any point x,y of a curve is

a x^2 b y^2

c a constant d x

46. The equation of tangent to the curve

$\left(\frac{x}{a}\right)^n + \left(\frac{y}{b}\right)^n = 2$ at (a, b) is

a $\frac{x}{a} + \frac{y}{b} = 2$ b $\frac{x}{a} + \frac{y}{b} = \frac{1}{2}$

c $\frac{x}{b} - \frac{y}{a} = 2$ d $ax + by = 2$

47. If $\int_0^{\infty} \frac{x^2 dx}{(x^2+a^2)(x^2+b^2)(x^2+c^2)} = \frac{\pi}{2(a+b)(b+c)(c+a)}$, then the value of $\int_0^{\infty} \frac{1}{(x^2+4)(x^2+9)} dx$ is

(a) $\frac{\pi}{60}$ (b) $\frac{\pi}{20}$ c $\frac{\pi}{40}$ d $\frac{\pi}{80}$

48. $\int \left(e^{a\log x} + e^{x\log a}\right) dx$ is equal to

a $\frac{x^{a+1}}{a+1} + c$ b $\frac{x^{a+1}}{a+1} + \frac{a^x}{\log a} + c$

c $x^{a+1} + a^x + c$ d $\frac{x^{a+1}}{a-1} + \frac{\log a}{a^x} + c$

49. $\int_0^a \frac{dx}{x+\sqrt{a^2-x^2}}$ is

(a) $\frac{a^2}{4}$ b) $\frac{\pi}{2}$ cc) $\frac{\pi}{4}$ (c π

50. If $\int_{-1}^{4} f(x)\,dx = 4$ and $\int_{2}^{4} [3 - f(x)\,dx = 7$, then the value of $\int_{-1}^{2} f(x)\,dx$ is

a -2 b 3 c 5 d 8