TENSORS

PHYSICS

1) In an experiment to determine the speed of sound in air at room temperature using a resonance tube. The air column in the pipe resonates with a tuning fork of frequency 500Hz when the minimum length of the air column is 15cm. Find the speed of sound at room temperature given the diameter of the pipe is 6cm.

a)328 m/sec
b)330 m/sec
c)336 m/sec
d)333 m/sec

2) Six point masses each of mass m are placed at the vertices of a regular hexagon of side l. The gravitational force acting on any of the masses is

(a) $\frac{Gm^2}{l^2}\left[\frac{5}{4}+\frac{1}{\sqrt{3}}\right]$

(b) $\frac{Gm^2}{l^2}\left[\frac{3}{4}+\frac{1}{\sqrt{3}}\right]$

(c) $\frac{Gm^2}{l^2}\left[\frac{5}{4}-\frac{1}{\sqrt{3}}\right]$

(d) $\frac{Gm^2}{l^2}\left[\frac{3}{4}-\frac{1}{\sqrt{3}}\right]$

3) The magnetic field of an electromagnetic wave is given by:

$$B = 3\times10^{-6}\cos(2\times10^{7}z+8\times10^{14}t)(5i+4j)\frac{wb}{m^2}$$

The associated electric field is

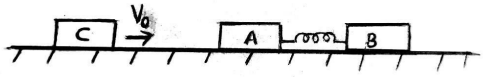
a) $9\times10^{2}\sin(2\times10^{7}z+8\times10^{14}t)(5i+4j)$

b) $9\times10^{2}\cos(2\times10^{7}z+8\times10^{14}t)(4i-5j)$

c) $9\times10^{2}\sin(2\times10^{7}z+8\times10^{14}t)(-4i+5j)$

d) $9\times10^{2}\cos(2\times10^{7}z+8\times10^{14}t)(-4i+5j)$

4) A block C of mass m is moving with velocity v_0 and collides elastically with block A of mass m and connected to another block B of mass 2m through a spring of spring constant k. What is k if x_0 is compression of spring when velocity of A and B are the same.



(a) $\frac{mv_0^2}{x_0^2}$

(b) $\frac{mv_0^2}{2x_0^2}$

(c) $\frac{3mv_0^2}{2x_0^2}$

(d) $\frac{2mv_0^2}{3x_0^2}$

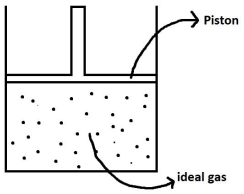
5) A car is moving towards a tall building which reflects sound,at a velocity of 72km/hr. Speed of sound in air is 320 m/s.Find frequency heard by car.(Honking frequency is 20Hz)

a)18.50Hz
b)22.66Hz
c)24.33HZ
d)25.125HZ

6) If the radius of Bohr's second orbit of Hydrogen atom is 'α', then the radius of the orbit of the third excited state of a Hydrogen-like atom with **Z**=4 is .

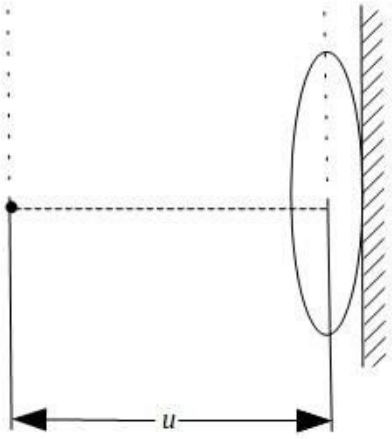
A. α
B. 2α
C. $\frac{\alpha}{2}$
D. $\frac{\alpha}{4}$

7) An ideal gas equips the volume shown in the figure. Top of the piston is exposed to the atmosphere. Weight of the piston is 10kg.When 100KJ heat is added to system, 40KJ work is done by ideal gas.Find gamma of ideal gas



a)5/2
b)5/3
c)3/2
d)7/5

8) In the figure given below, the thin converging lens having both the surfaces of same radius $30\ \text{cm}$ is made up from a material of refractive index 9/8 and the surrounding medium of the setup is air. Find the value of 'u' so that the lens-mirror combination results in an image forming at the same position as that of the object.



A. $u = 30\ \text{cm}$
B. $u = 35\ \text{cm}$
C. $u = 40\ \text{cm}$
D. None of these

9) A stone projected with a velocity u at an angle θ with the horizontal reaches maximum height H_1. When it is projected with velocity u at an angle $(90^0 - \theta)$ with the horizontal, it reaches a maximum height H_2. The relation between the horizontal range R of the projectile and heights H_1 and H_2 is

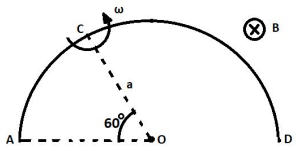
(a) $R = 4\sqrt{H_1 H_2}$

(b) $R = 4(H_1 - H_2)$

(c) $R = 4(H_1 + H_2)$

(d) $R = \frac{H_1^2}{H_2^2}$

10) A uniform wire of resistance per unit length α is bent into a uniform semicircle of radius 'a'.The wire rotates with angular velocity 'ω' in a vertical plane about a horizontal axis passing through C.A uniform magnetic field 'B' exists in space in a direction perpendicular to paper inwards.calculate the potential difference between 'A' and 'B'?



a) $\frac{Ba\omega^2}{2}$

b) $\frac{-3Ba\omega^2}{2}$

c) $Ba\omega^2$

d) $\frac{-Ba\omega^2}{4}$

11) There are 100 divisions on the circular scale of a screw gauge with a pitch of 0.5mm.The screw gauge reads 3 circular scale divisions even without putting anything in between the jaws.While measuring the diameter of a wire ,there are 4 divisions on the main scale and 23rd circular scale division coincide with reference line .The diameter of the wire is

a)1.90mm

b)2.13mm

c)2.10mm

d)1.87mm

12) An object of mass 0.1Kg executes simple harmonic motion along X-axis with frequency of $\frac{20}{\pi}Hz$.At the position x=0.06m, the object has kinetic energy of 0.6J and potential energy of 0.2J. The amplitude of oscillation in meters is equal to.

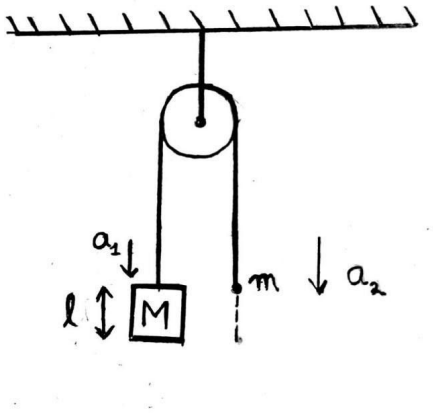
(A)0.08m

(B)0.12m

(C)0.14m

(D)None of these

13) Figure shows an arrangement of a rod of length l and mass m attached to a weightless string passing over a frictionless pulley. At t=0, the bead is in level with the upper end of the rod . The bead slides down the string with considerable friction, and is opposite to the other end of the rod after t seconds. Assuming friction between the bead and the string to be constant all through, the frictional force is



(a) $\frac{2Mml}{(m-M)t^2}$

(b) $\frac{2Mml}{(m+M)t^2}$

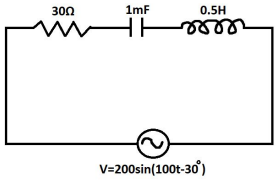
(c) $\frac{Mml}{(m-M)t^2}$

(d) $\frac{4Mml}{(m-M)t^2}$

14) A metallic block weighs 169N in air. It weighs 121N when immersed in water and 144N when immersed in a different liquid. What is the specific gravity of the liquid?

a)23/144
b)121/144
c)25/48
d)23/48

15) Find the time function of current in the given circuit?



a) $I = 4\sin(100t - 53^\circ)$

b) $I = \frac{20}{3}\sin(100t - 53^\circ)$

c) $I = \frac{20}{3}\cos(100t + 30^\circ)$

d) $I = 4\sin(100t - 23^\circ)$

16) A particle of mass M initially at rest decays into two particles of masses m_1 and m_2 having non zero velocities. Then the ratio of De Broglie wavelengths of the particles $\frac{\lambda_1}{\lambda_2}$ is

A. $\frac{m_1}{m_2}$
B. $\frac{m_2}{m_1}$
C. 1
D. None of these

17) A bullet of mass 20g and moving with 600m/s collides with a block of mass 4 kg hanging with the string. What is the velocity of the bullet when it comes out of the block, if the block rises to a height of 0.2m after collision?

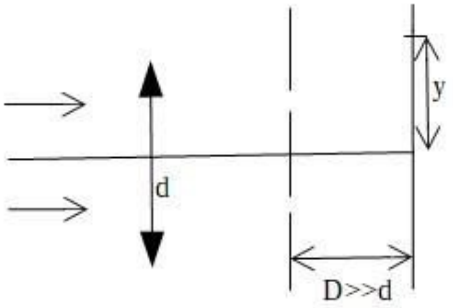
(a) 200m/s

(b) 150m/s

(c) 400m/s

(d) 300m/s

18) Consider the YDSE experiment shown in figure. If d=10 λ then the position of 8th maxima is



A. $y = \frac{D}{10}$
B. $y = \frac{D}{3}$
C. $y = \frac{4D}{5}$
D. $y = \frac{4D}{3}$

19) A straight segment OC (of length 'L')of a circuit carrying a current 'I' is placed along the x-axis.Two infinitely long straight wires A and B are fixed at y=(-a) and y=(+a) respectively.If A and B each carry a current 'I' into the x-y plane obtain the expression for the force acting on the segment OC?

a) $\frac{\mu_0 I^2}{2\pi}\ln\frac{L^2 + a^2}{a^2}$ in positive z direction

b) $\frac{\mu_0 I^2}{2\pi} \cdot \frac{L^2+a^2}{a^2}$ in negative z direction

c) $\frac{\mu_0 I^2}{2\pi} \cdot \frac{L^2+a^2}{a^2}$ in positive z direction

d) $\frac{\mu_0 I^2}{2\pi} \ln \frac{L^2+a^2}{a^2}$ in negative z direction

20) In a system of particles 4Kg mass is subjected to a force of 6N along +ve X-axis and another 2Kg mass is subjected to a force of 3N along +ve Y-axis. The magnitude of acceleration of centre of mass and angle made by it with X-axis are given respectively by.

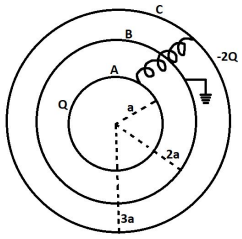
a) $1m/sec^2, \theta = \arctan\sqrt{3}$

b) $\frac{\sqrt{5}}{2} m/sec^2, \theta = 45^\circ$

c) $3\sqrt{5} m/sec^2, \theta = \arctan\frac{2}{3}$

d) $\frac{\sqrt{5}}{2} m/sec^2, \theta = \arctan\frac{1}{2}$

21) In a system of concentric shells A,B,C with radius a,2a,3a respectively with A and C internally connected .A is given a charge Q and C is given a charge -2Q and B is earthed.The final charge on B is nQ/11.

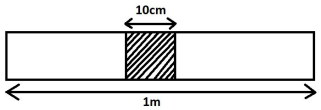


Find the value of n/4

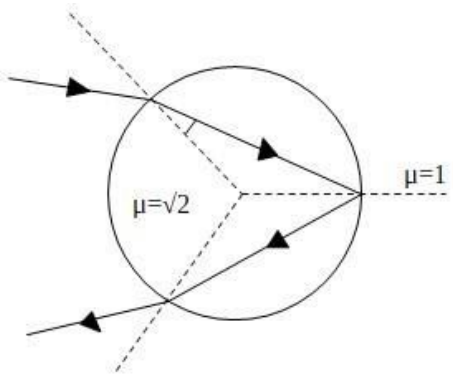
22) A pulley of radius 4m is rotated about its axis by a force $F = (10t - 2t^2)N$ applied tangentially. If the moment of inertia of the pulley about its axis of rotation is $5kgm^2$, the time taken by the pulley to reverse its direction of motion is a/b seconds. Then the value of a-4b is.(The pulley is initially at rest and *a* and *b* are positive integers)

23) An iron ring is to be fitted on to a wooden ring of 2.006m radius. The diameter of the iron ring is 12mm smaller than that of the wooden ring. The iron ring should be heated, so that its temperature increases by a minimum of $X^\circ C$. Then the value of X/50 is.(The coefficient of cubical expansion of iron is $3.6 \times 10^{-5}/^\circ C$).

24) A cylinder is kept in a horizontal position as shown in the figure.Middle portion is filled with a liquid(20cm liq=atmospheric pressure).Other portions are filled with air at atmospheric pressure. When cylinder is made vertical,let the liquid fall by x.Assume air follows PV=const.Assume liquid doesn't compress.If $x^2 + ax - b^2 = 0$,Find the sum of digits of a.



25) The total deviation the incident ray undergoes in the figure given below is expressed as '$30n$' in degrees, where n is a natural number. Find the value of n.



CHEMISTRY

1) Which d orbitals of the central atom are involved in hybridization in SF_6?

a) d_{z^2} only
b) d_{z^2} and d_{xy}
c) d_{z^2} and $d_{x^2-y^2}$
d) d_{xy} and $d_{x^2-y^2}$

2) Back bonding in BF_3 does not affect which of the following?

a) Planarity,lewis acid strength and bond angle
b) Bond length,hybridization and bond strength
c) Bond angle,planarity and geometry
d) Lewis acidity,bond length and bond order(B-F)

3) There are x,y,z equivalents of KOH, $Ca(OH)_2$ and Na_2CO_3 respectively. How many equivalents of HCl is needed to see an endpoint if HPh is used as indicator and if MeOH is used as indicator.

a) x+2y+z,x+2y+2z
b) x+2y+2z,x+2y+z
c) x+2y+z,z
d) z,x+2y+z

4) Which of the following statements are true?'

I. First ionization enthalpy of Gallium is more then the first ionization enthalpy of Aluminium.
II. The second Electron Affinity of oxygen is positive.
III. All lanthanoids are radioactive.
IV. Electron Affinity of Fluorine is greater than that of Chlorine.

a) I,II,III
b) III,IV
c) II,III
d) I,II

5) Give the order of solubility of AgCl in:

I. Water
II. 0.1M KCl
III. 0.5M $AgNO_3$
IV. 0.2M $CaCl_2$
V. 0.05M $BaCl_2$

a) I>V>II>IV>III
b) I>V=II>IV>III
c) III>IV>V=II>I
d) I>V=II>III>IV

6) For a triprotic acid H_3A, $Ka_1=10^{-2}$, $Ka_2=10^{-5}$, $Ka_3=10^{-11}$. At what pH HA^{2-} will be at maximum concentration?

a) 7
b) 9
c) 8
d) 11

7) Which of the following is true?

I. $Fe+3HCl \longrightarrow FeCl_3+1.5H_2$
II. Promoters and catalysts are the same.
III. $NH_3+NaH \longrightarrow NaNH_2+H_2$
IV. $3Fe+4H_2O_{(g)} \longrightarrow Fe_3O_4+4H_2$

a) All are correct
b) I,III,IV
c) I,IV
d) III,IV

8) Which of the following is true about Borazole?

I. It is called inorganic benzene.
II. Its molecular formula is $B_3N_3H_6$.
III. It has 3 pi bonds.

a) I,II
b) I
c) II,III
d) All of these

9) Carbon suboxide is produced by heating:

a) Malomic acid
b) Glutaric acid
c) Succinic acid
d) Oxalic acid

10.Arrange in increasing order of C-O bond length:

I. $Fe(CO)_5$
II. $Co(CO)_4^-$
III. $Ni(CO)_4^{2-}$

a) I<II<III
b) III<II<I
c) I=II=III
d) I<III<II

11) A compound formed by X and Y has a cubic structure in which X atoms are at corners and face centers. Y atoms are at the body center and edge centers. What is the molecular formula if all the atoms along a face diagonal of the cube are removed?

a) X_5Y_4
b) $X_{13}Y_{16}$
c) XY
d) X_3Y_7

12) The constituent monomers of Dacron are:

a) Ethylene glycol and phthalic acid
b) Phthalic acid and ethanol
c) Terephthalic acid and Ethylene glycol
d) Terephthalic acid and ethanol

13) Equanil is an example of:

a) Analgesic
b) Tranquilizer
c) Antihistamine
d) Antibiotic

14) Which of the following are true about amylose and amylopectin

I. Amylose is water soluble.
II. Amylopectin is a branched chain polymer of α-D-glucose units.
III. Amylose is branched chain polymer of α-D-glucose units.
IV. Amylopectin is formed by C_1-C_6 glycosidic linkage.

a) I,II,IV
b) I,II
c) IV
d) All of these

TENSORS

15) In which of the following Sulphur is present in multiple oxidation states.

a) Thiosulphuric acid
b) Marshall's acid
c) Caro's acid
d) All of these

16) Derive an expression for K(rate constant) in terms of r_0, r_t, r_∞ and t where they are specific relations at time $t = 0$, $t = t$ and $t = \infty$

$$C_{12}H_{22}O_{11} + H_2O \xrightarrow{H^+} C_6H_{12}O_6 + C_6H_{12}O_6$$

Sucrose Glucose Fructose

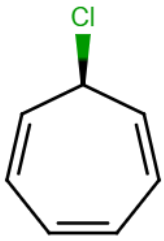
a) $k = \frac{2.303}{t} \log \frac{r_0 - r_\infty}{r_t - r_\infty}$

b) $k = \frac{2.303}{t} \log \frac{r_0}{r_t}$

c) $k = \frac{2.303}{t} \log \frac{r_t - r_\infty}{r_0 - r_\infty}$

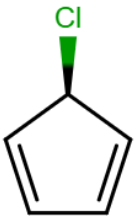
d) $k = \frac{2.303}{t} \log \frac{r_\infty}{r_t}$

17) Which of the following will produce white precipitate with $AgNO_3$



1

2



3

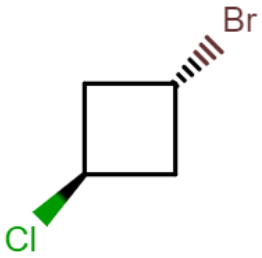
a)1

b)2

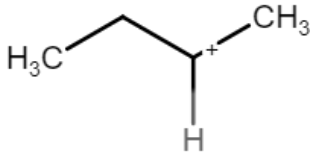
c)3

d)1 and 2

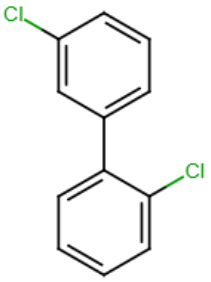
18) Which of the following is optically active?



a)



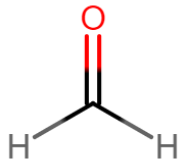
b)



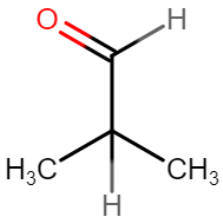
c)

d)

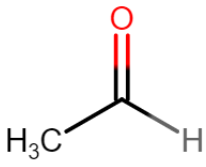
19) Which of the following compounds undergoes both Aldol condensation and cannizzaro reaction?



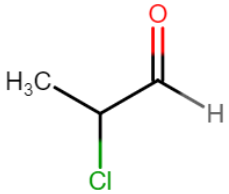
a)



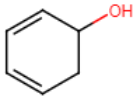
b)



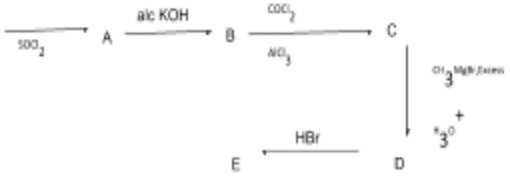
c)

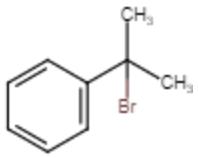


d)

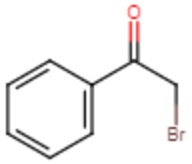


20) The compound undergoes the following reactions .Identify the product E.

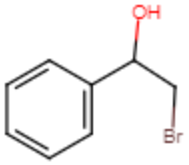




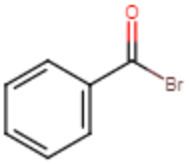
a)



b)



c)



d)

21) Packing fraction of diamond is X% ,where X is an integer.Find the sum of digits of X.

22) How many of the following combinations are correct:

I. Galena-HgS
II. Malachite-$CuCO_3.Cu(OH)_2$
III. Fluorspar-CaF_2
IV. Pyrolusite-MnO_2
V. Cinnabar-AgS
VI. Zincite-ZnO
VII. Horn Silver-AgCl
VIII. Rutile-PbS

23) Solution of $CuSO_4$ in which Cu rod is dipped is diluted to 100 times. Reduction potential will decrease by X.100X can be rounded off to the integer.

24) 57.5ml of a mixture of CO and CH_4 was exploded with 85ml of O_2. Volume of CO_2 was 50ml. The initial amount (in ml) of CH_4 that was

present is V. Given that the O_2 gas present is just enough for complete combustion.

$$\frac{V+2.5}{10}=?$$

25) Lattice energy of solid XY is 150Kcal/mol, dissolution of solid in water is endothermic to an extent of 3Kcal/mol. If hydration energies of X^+ and Y^- are in the ratio of 6:5, the enthalpy of hydration of X^+ is H

$\frac{H}{10}$ can be rounded off to the nearest integer.

MATHEMATICS

1. Two sets X and Y have 25 elements in common, Then No. of elements common to $X \times Y$ and $Y \times X$ is
   a) 25
   b) 250
   c) 625
   d) 100

2. Solve the differential equation
   $\frac{dy}{dx}=x^3y^3-xy$
   a) $(x^2+1+ce^{x^2})y^2=1$
   b) $(x^2+1-ce^{x^2})y^2=1$
   c) $(x^2+1+ce^{x^2})y=1$
   d) $(x^2+1-ce^{x^2})y=1$

3. Find the coefficient of x^{50} in the expansion of $(1+x)^{1000}+2x(1+x)^{999}+3x^2(1+x)^{998}+...+1001x^{1000}$.
   (a) $^{1020}C50$
   (b) $^{1002}C50$
   (c) $^{1002}C52$
   (d) $^{1000}C50$

4. $x^2+b^2=1-2bx$ and $x^2+a^2=1-2ax$, both the equation have a common root if $a \neq b$, then
   a) a+b=2
   b) a+b=-2
   c) a+b=± 1
   d) |a-b|=2

5. Let S be the set of non real numbers z such that $\frac{1+z+z^2}{1-z+z^2} \in R$. Also let P be the set of complex numbers z such that $\frac{\omega-\bar{\omega}z}{1-z}$ is defined and purely Real (ω *is the cube root of unity*). Then which of the following statements are true?
   (i) The two sets are the same
   (ii) $S \subset P$
   (iii) Centroid of the polygon with $2n$ *vertices* $z_1, z_2, \ldots\ldots, z_n, \frac{1}{z_1}, \frac{1}{z_2}, \ldots\ldots, \frac{1}{z_n}$ lies on the *imaginary axis.* $(z_1, z_2, \ldots\ldots, z_n \in S)$
   (iv) $a \in P$ *can be the root of the equation* x^2+x+1

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

6. Let $I_n=\int cosec^n x dx$ Reduced form of I_n is $I_n=\frac{a}{b}cosec^{n-3}xdx+CI_{n-2}$. Which among the following is false.

a) $a = -\frac{\mathrm{d}}{\mathrm{d}x} cosecx$

b) $C = \frac{n-2}{n-1}$

c) $b = 1 - n$

d)None of these.

7. The perpendicular from the origin to the tangent at any point on a curve is equal to the abscissa of the point of contact. Find the nature of the curves satisfying above conditions

a)Circle

b)Pair of straight line

c)Hyperbola

d)Parabola

8. $a_n = \sum_{r=0}^{n} \frac{1}{{}^{n}C_r}$, then find the value of $\sum_{r=0}^{n} \frac{n-2r}{{}^{n}C_r}$

(a) n/4 a_n

(b) 1/4 a_n

(c) 0

(d) n/2 a_n

9. Find the area of the region enclosed between the two ellipses $\frac{x^2}{16} + \frac{y^2}{9} = 1$ and $\frac{(x-4)^2}{16} + \frac{y^2}{9} = 1$

a) $2\pi - 3\sqrt{3}$

b) $2\pi + 3\sqrt{3}$

c) $4\pi - 3\sqrt{3}$

d) $4\pi + 3\sqrt{3}$

10. For all n natural numbers,P(n):(2n+7) < K, Find K

(a)(n+3) (b) $(n+3)^2$ (c) 3(n+3)/2

(d) None of these

11. *Let $f(x)$ be a real valued function defined over the interval $(1,5)$ such that $f(2) = 3$, $f(4) = 3$* . Then

A) There exist at least a *c such that $f'(c) = 0$ over the interval $(2,4)$*.

B) We can comment about the nature of *$f'(x)$ over the interval $(1,2)$*.

C) *$f(x)$* must be a positive function.

D) *$f(x)$ may or may not have an extreme minimum over the interval $(1,5)$*

12. Find the domain of the function

$$f(x) = \sqrt{\log_{10} \frac{5x - x^2}{6}}$$

a) (3,2)

b) [3,2]

c) (0,2)

d) (0,2) U [3,2]

13. Find the maximum and minimum value of cos^2(θ) - 6sin(θ)cos(θ) +3 sin^2(θ) +2

A. 3+√10 and 3-√10

B. 4+√10 and 4-√10

C. 4+√5 and 4-√5

D. 3+√5 and 3-√5

14. The variance of 20 observations is 5.If each observation is multiplied by 2, then the new variance of the resulting observations is

A) 50

B) 20

C) 40

D) 5

TENSORS

15. Let $\vec{a} = 2\hat{i} + 2\hat{j} + \hat{k}$ and $\vec{b} = 2\hat{i} + \hat{j}$. If $\vec{c}$ is a vector such that $\vec{a} \cdot \vec{c} = |\vec{c}|$, $|\vec{c} - \vec{a}| = 2\sqrt{2}$ and the angle between $\vec{a} \times \vec{b}$ and $\vec{c}$ is $\frac{\pi}{6}$. Then $\left|\left(\vec{a} \times \vec{b}\right) \times \vec{c}\right|$ is

a) 2/3
b)3/2
c)1
d)2

16. The area formed by the tangent, the normal drawn at $(1, \sqrt{3})$ to the circle $x^2 + y^2 = 4$ and the positive x-axis is

$$a)2\sqrt{3} \quad b)\sqrt{3} \quad c)4\sqrt{3} \quad d)\frac{\sqrt{3}}{2}$$

17. *If* $x = cy + bz,\ y = az + cx,\ z = bx + ay.$ *Where* x, y, z *are not simultaneously zeros* Then find the value of $a^2 + b^2 + c^2$.

A) $1 - 2abc$
B) $1 - 2ab$
C) $2bc$
D) 1

18. $(p \rightarrow q) \leftrightarrow (q \cap p)$ is

(a) Tautology
(b) $\sim q$
(c) p
(d) None of these

19. The line 4x+y = 1 passes through the point A(2,-7) and intersects point B on the line BC whose equation is 3x-4y+1=0. The equation of the line AC is ax+by+c=0 (a,b and c are all coprime). The distance from A to B is the same as the distance from A to C. What is the minimum positive value of a+b+c?

(a) 660
(b) 670
(c) 330
(d) 130

20. Sixteen teams t1,t2,...,t16 play in a tournament. They are divided into eight pairs at random. From each pair, a winner is decided on the basis of a game played between the two teams of the pair. Assume that all the teams are of equal strength. The probability that" exactly one of the two teams t1 and t2 is among the eight winners", is

A)8/15
B) 7/15
C) 9/15
D) 4/15

21. If 'p' is the sum, 'q' is the product and 's' is the sum of reciprocals of n terms of a GP, then find the value of $q^2(s/p)^n$

22. Suppose the foci of the ellipse $\frac{x^2}{9} + \frac{y^2}{8} = 1$ are $(f_1,0)$ and$(f_2,0)$ where $f_1 > 0$, $f_2 < 0$. Let P_1 and P_2 be the parabolas with origin vertex and foci at $(f_1,0)$ and $(3f_2,0)$ respectively. Let T_1 be tangent to P_1 which passes through $(3f_2,0)$ and T_2 be a

tangent to P_2 which passes through $(f_1,0)$. If m_1 and m_2 is the slope of T_1 and T_2 respectively. Then the value of (m_1^2+1/m_2^2) is k, then k/0.11 is

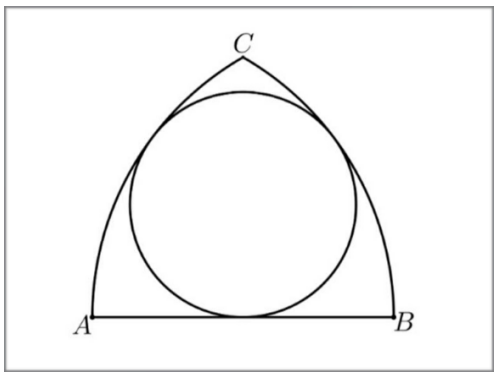
$adj\,(adj\,(...adj\,(A)))\,(n\ times) = n,$ and the sum of all the elements of A is a two-digit number.

Also if

$$\begin{vmatrix} x^{\alpha} & x^{\alpha+2} & x^{\alpha+3} \\ y^{\alpha} & y^{\alpha+2} & y^{\alpha+3} \\ z^{\alpha} & z^{\alpha+2} & z^{\alpha+3} \end{vmatrix} = (x-y)(y-z)(z-x)\left(\frac{1}{x}+\frac{1}{y}+\frac{1}{z}\right)$$

Then $\alpha + n =$

23.



AC and BC are arcs with centres B and A respectively. The circle in the figure passes through the midpoint of AB and touches both the arcs. If AB = 12, find the radius of the circle. If the radius is k, then k+0.5 is

24. If $g(x) = lim\ m\to\infty \frac{x^m f(1)+8}{2x^m+3x+3}$ is continuous at $x = 1 and\ g(1) = lim\ x\to 0\ \frac{\int_0^{x^2} cos\ t^2\ dt}{xsin\ x}$, then the value of $2g(1)+3f(1)\ is$

25. Let A be an invertible square matrix of order n such that