NEW STANDARD ACADEMY

TEST TYPE - 05

Do not open this Test Booklet until you are asked to do so. **13-01-2025**

JEE(MAIN):11th Undergoing Students

Read carefully the Instructions on the Back Cover of this Test Booklet.

Important Instructions :

1. Immediately fill in the form number on this page of the Test Booklet with Blue/Black Ball Point Pen. Use of pencil is strictly prohibited.
2. The candidates should not write their Form Number anywhere else (except in the specified space) on the Test Booklet/Answer Sheet.
3. The Test Booklet consists of 90 questions.
4. There are three parts in the question paper 1,2,3 consisting of Physics, Chemistry and Mathematics having 30 questions in each subject and each subject having Two sections. (i) Section-I contains 20 multiple choice questions with only one correct option. Marking scheme : +4 for correct answer, 0 if not attempted and –1 in all other cases. (ii) Section-II contains 10 Numerical Value Type questions. Attempt any 5 questions. First 5 attempted questions will be considered for marking. Marking scheme : +4 for correct answer, 0 if not attempted and –1 in all other cases.
5. Use Blue/Black Ball Point Pen only for writting particulars/marking responses on Side –1 and Side–2 of the Answer Sheet. Use of pencil is strictly prohibited.
6. No candidate is allowed to carry any textual material, printed or written, bits of papers, mobile phone any electronic device etc, except the Identity Card inside the examination hall/room.
7. Rough work is to be done on the space provided for this purpose in the Test Booklet only.
8. On completion of the test, the candidate must hand over the Answer Sheet to the invigilator on duty in the Room/ Hall. However, the candidate are allowed to take away this Test Booklet with them.

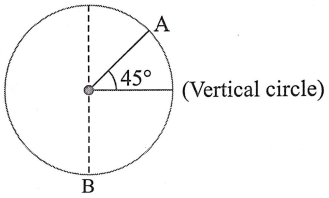
Name of the Candidate(In Capitals) _____

Date of Examintation _____

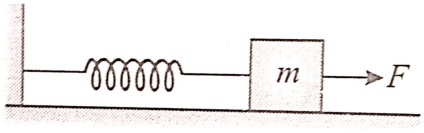
Candidate`s Signature:_____ Invigilator`s Signature: _____

PHYSICS

1. The ratio of powers of two motors is $\frac{3\sqrt{x}}{\sqrt{x}+1}$ that are capable of raising 300 kg water in 5 minutes and 50 kg water in 2 minutes respectively from a well of 100 m deep. The value of x will be
   (a) 2 (b) 4
   (c) 2.4 (d) 16
2. A constant power delivering machine has towed a box, 2 which was initially at rest, along a horizontal straight line The distance moved by the box in time 't' is proportional to
   (a) $t^{2/3}$ (b) $t^{3/2}$
   (c) t (d) $t^{½}$
3. A body of m kg slides from rest along the curve of vertical circle from point A to B in friction less path. The velocity of the body at B is



   (given, R = 14m g = 10m / s^2 and $\sqrt{2}$ = 1.4)
   (a) 21.9 m/s (b) 10.6 m/s
   (c) 19.8 m/s (d) 16.7 m/s
4. The bob of a pendulum was released from a horizontal position. The length of the pendulum is 10 m. If it dissipates 10% of its initial energy against air resistance, the speed with which the bob arrives at the lowest point is [g = 10m s^{-2}]
   (a) $6\sqrt{5}$ ms^{-1}
   (b) $5\sqrt{5}$ ms^{-1}
   (c) $2\sqrt{5}$ ms^{-1}
   (d) $5\sqrt{6}$ ms^{-1}
5. A block of mass m, lying on a smooth horizontal surface, is attached to a spring (of negligible mass) of spring constant k. The other end of the spring is fixed, as shown in the figure. The block is initally at rest in its equilibrium position. If now the block is pulled with a constant force F, the maximum speed of the block is

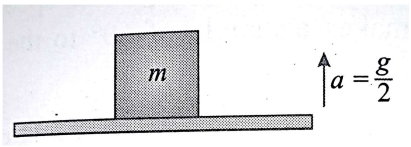


   (a) $\frac{\pi F}{\sqrt{mk}}$ (b) $\frac{2F}{\sqrt{mk}}$
   (c) $\frac{F}{\sqrt{mk}}$ (d) $\frac{F}{\pi\sqrt{mk}}$
6. If the kinetic energy of a moving body becomes four times its initial kinetic energy, then the percentage change in its momentum will be
   (a) 100% (b) 200%
   (c) 300% (d) 400%
7. A particle is moving is moving in a circular path of radius a under the action of an attractive potential U = (- k) / 2 r^2 Its total energy is:
   (a) - 3/2 k/a^2 (b) - $k/4a^2$
   (c) $k/2a^2$ (d) Zero
8. Three bodies A, B and C have equal kinetic energies and their masses are 400 g, 1.2 kg and 1.6 kg respectively. The ratio of their linear momenta is
   (a) 1 : $\sqrt{3}$: 2
   (b) 1:√3:√2
   (c) √3:√2:1
   (d) √2:√3:1
9. A boy is rolling 0.5 kg ball on the frictionless floor with the speed of $20ms^{-1}$ The ball gets deflected by an obstacle on the way. After deflection it moves with 5% of its initial kinetic energy. What is the speed of the ball now?
   (a) $19ms^{-1}$
   (b) $4.47ms^{-1}$
   (c) $14.41ms^{-1}$
   (d) $1.00ms^{-1}$
10. A body of mass 'm' dropped from a height 'h' reaches the ground with a speed of $0.8\sqrt{gh}$. The value of work done by the air-friction is
    (a) -0.68 mgh
    (b) mgh
    (c) 0.64 mgh
    (d) 1.64 mgh
11. A particle of mass 500 gm is moving in a straight line with velocity v = b $x^{5/2}$ .The work done by the net force during its displacement from x = 0 to x = 4 m is
    (Take b = $0.25m^{-3/2}$ s^{-1})
    (a) 2J (b) 4J
    (c) 8 J (d) 16 J
12. A body of mass 8 kg and another of mass 2 kg are moving with equal kinetic energy. The ratio of their respective momenta will be
    (a) 1:1 (b) 2:1
    (c) 1:4 (d) 4:1
13. A stone is projected at angle 30^0 to the horizontal. The ratio of kinetic energy of the stone at point of projection to its kinetic energy at the highest point of flight will be
    (a) 1:2 (b) 1:4
    (c) 4:1 (d) 4:3
14. A particle which is experiencing a force, given by $\vec{F} = 3\vec{\imath} - 12\vec{\jmath}$, undergoes a displacement of $\vec{d} = 4\vec{\imath}$ If the particle had a kinetic energy of 3 J at the beginning of the displacement, what is its kinetic energy at the end of the displacement?
    (a) 15 J (b) 10 J
    (c) 12 J (d) 9J

15. A block of mass 100 kg slides over a distance of 10 m on a horizontal surface. If the co-efficient of friction between the surfaces is 0.4, then the work done against friction (in J) is
(a) 4200 (b) 3900
(c) 4000 (d) 4500

16. A body of mass 0.5 kg travels on straight line path with velocity v = $(3x^2 + 4)$ m/s. The net workdone by the force during its displacement from x = 0 to x = 2 m is
(a) 64 J (b) 60 J
(c) 120 J (d) 128 J

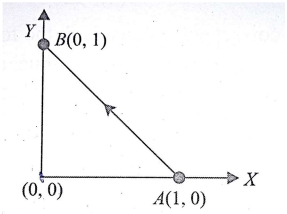
17. A block of mass m is kept on a platform which starts from rest with constant acceleration g/2 upward, as shown in figure. Work done by normal reaction on block in time t is



(a) 0 (b) $\frac{3mg^2t^2}{8}$
(c) $-\frac{mg^2t^2}{8}$ (d) $\frac{mg^2t^2}{8}$

18. A uniform cable of mass 'M' and length 'L' is placed on a horizontal surface such that its $\left(\frac{1}{2}\right)^{th}$ part is hanging below the edge of the surface. To lift the hanging part of the cable upto the surface, the work done should be
(a) MgL/n^2
(b) $MgL/2n^2$
(c) $2MgL/n^2$
(d) nMgL

19. Consider a force $\vec{F}$ = -x $\hat{\imath}$ + y $\hat{\jmath}$. The work done by this force in moving a particle from point A(1, 0) to B(0, 1) along the line segment is (all quantities are in SI units)



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

20. A porter lifts a heavy suitcase of mass 80 kg and at the destination lowers it down by a distance of 80 cm with a constant velocity. Calculate the work done by the porter in lowering the suitcase. (take g = 9.8m s^{-2})
(a) -62720.0 J (b) -627.2 J
(c) +627.2 J (d) 784.0 J

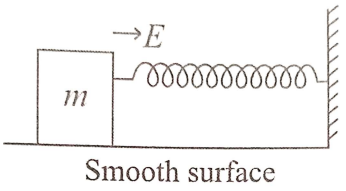
21. A body of mass 2 kg is initially at rest. It starts moving unidirectionally under the influence of a source of constant power P. Its displacement of a will be in 4 sec is 1/3 $\alpha^2 \sqrt{P}$ m The value of α will be _____

22. If the maximum load carried by an elevator is 1400 kg (600 kg - Passenger + 800 kg elevator), which is moving up with a uniform speed of 3m s^{-1} and the frictional force acting on it is 2000 N, then the maximum power used by the motor is _____kW (g = 10m / s^2)

23. A 0.4 kg mass takes 8 s to reach ground when dropped from a certain height 'P' above surface of earth. The loss of potential energy in the last second of fall is_____ J. [Take g = 10 m/s²]

24. A spherical body of mass 2 kg starting from rest acquires a kinetic energy of 10000 J at the end of 5 second. The force acted on the body is_____ N.

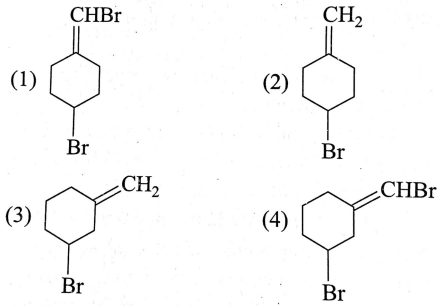
25. A block of mass 'm' (as shown in figure) moving with kinetic energy E compresses a spring through a distance 25 cm when, its speed is halved. The value of spring constant of used spring will be nE Nm^{-1} for n =_____



CHEMISTRY

1. The incorrect statement regarding conformation of ethane is:
(a) Ethane has infinite number of conformations.
(b) The dihedral angle in staggered conformation is 60^0.
(c) Eclipsed conformation is the most stable conformation.
(d) The conformations of ethane are inter-convertible to one –another.

2. Which one of the following will show geometrical isomerism?



3. Match **List-I** with **List-II**

List-I (Pair of Compounds)		List-II (Isomerism)	
A.	n-Propanol and Isopropanol	I.	Metamerism
B.	Methoxypropane and Ethoxyethane	II.	Chain Isomerism
C.	Propanone and Propanal	III.	Position Isomerism
D.	Neopentane and Isopentane	IV.	Functional Isomerism

Choose the correct answer from the options given below:

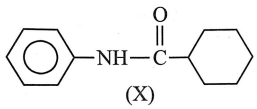
(a) (A)-(III), (B-(I), (C)-(IV), (D)-(II)

(b) (A)-(I), (B-(III), (C)-(IV), (D)-(II)

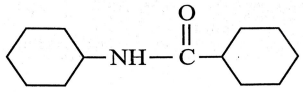
(c) (A)-(III), (B-(I), (C)-(II), (D)-(IV)

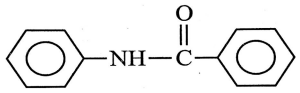
(d) (A)-(II), (B-(I), (C)-(IV), (D)-(III)

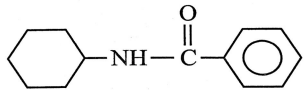
4. Which of the following is metamer of the given compound (X)?

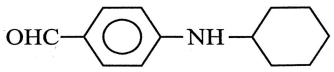


(X)

(1) 

(2) 

(3) 

(4) 

5. The incorrect statement regarding the geometrical isomers of 2- butane is:

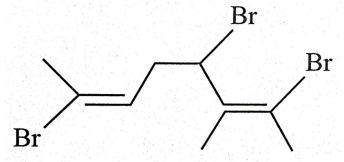
(a) trans-2-butene is more stable than cis-2-butene.

(b) cis-2-butene has less dipole moment than trans-2- butene.

(c) cis-2- butene and trans -2-butene are not interconvertible at room temperature.

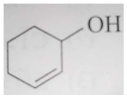
(d) Cis -2- butene and trans -2-butene are stereoisomers.

6. Total number of stereo isomers possible for the given structure:



(a) 8 (b) 2 (c) 3 (d) 4

7. According to IUPAC system the compound



is named as

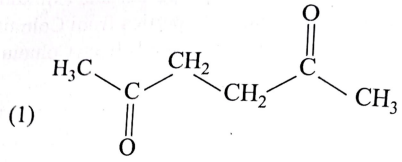
(a) Cyclohex –l-en-3-ol

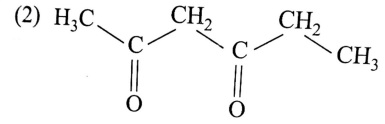
(b) Cyclohex-2-en-l-ol

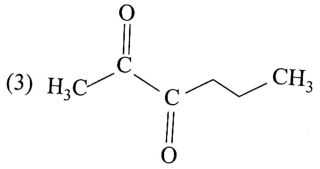
(c) Cyclohex –l-en -2-ol

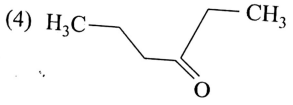
(d) l-Hydroxyhex -2- ene

8. Which of the following has highty acidic hydrogen ?

(1) 

(2) 

(3) 

(4) 

9. Match List I with List II

LIST I (Compound)		LIST II (pK_a value)	
A.	Ethanol	I.	10.0
B.	Phenol	II.	15.9
C.	m-Nitrophenol	III.	7.1
D.	p-Nitrophenol	IV.	8.3

Choose the correct answer from the options given below:

(a) A-1, B-II, C-III, D-IV

(b) A-II, B-1, C-IV, D-III

(c) A-III, B-IV, C-1, D-II

(d) A-IV, B-I, C-II, D-III

10. Among the following compounds, the most acidic is

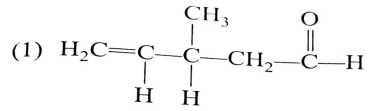
(a) p-Nitrophenol

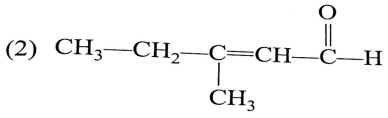
(b) p-Hydroxybenzoic acid

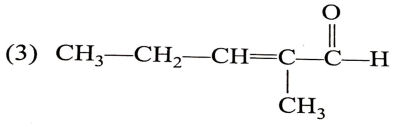
(c) o-Hydroxybenzoic acid

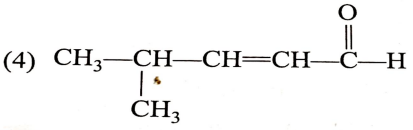
(d) p-Toluic acid

11. Structure of 4-Methylpent-2-enal is:

(1) 

(2) 

(3) 

(4) 

12. The correct stability order of carbocation is

(1) $(CH_3)_3C^+ > CH_3-\overset{+}{C}H_2 > (CH_3)_2\overset{+}{C}H > \overset{+}{C}H_3$

(2) $\overset{+}{C}H_3 > (CH_3)_2\overset{+}{C}H > CH_3-\overset{+}{C}H_2 > (CH_3)_3\overset{+}{C}$

(3) $(CH_3)_3\overset{+}{C} > (CH_3)_2\overset{+}{C}H > CH_3-\overset{+}{C}H_2 > \overset{+}{C}H_3$

(4) $\overset{+}{C}H_3 > CH_3-\overset{+}{C}H_2 > CH_3-\underset{CH_3}{\overset{+}{C}H} > (CH_3)_3C^+$

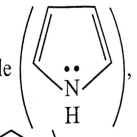
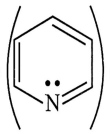
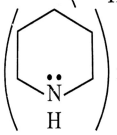
13. A species having carbon with sextet of electrons and can act as electrophile is called

(a) pentavalent carbon

(b) carbon free radical

(c) carbocation

(d) carbanion

14. Correct order of basic strength of Pyrrole  , Pyridine  and Piperidine  is:

[Basic Strength of Amines]

(1) Pyrrole > Pyridine > Piperidine

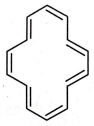
(2) Pyridine > Piperidine > Pyrrole

(3) Piperidine > Pyridine > Pyrrole

(4) Pyrrole > Piperidine > Pyridine

15. Which of the following are aromatic?

A.  B. 

C.  D. 

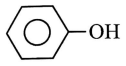
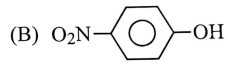
(a) C and D only

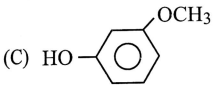
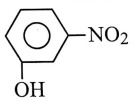
(b) B and D only

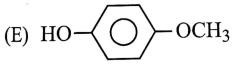
(c) A and C only

(d) A and B only

16. For the given compounds , the correct order of increasing pK_a value:

(A)  (B) 

(C)  (D) 

(E) 

Choose the correct answer from the options given below:

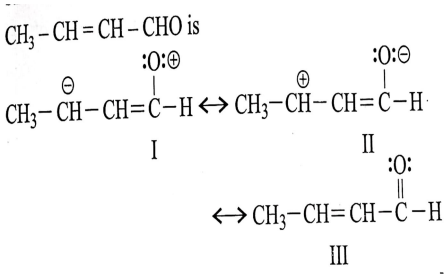
(1) (B)< (D) < (A) < (C) < (E)

(2) (E) < (D) < (C) < (B) < (A)

(3) (D) < (E) < (C) < (B) < (A)

(4) (E) < (D) < (B) < (A) < (C)

17. The correct stability order of the following resonance structures of



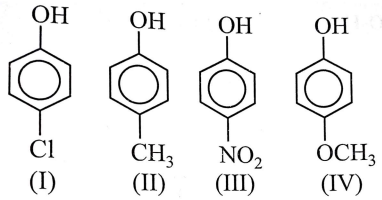
(a) II > I > III

(b) III > II > I

(c) II > III > I

(d) I > II > III

18. Arrange the following acidity: compounds in order of decreasing



(I) (II) (III) (IV)

(1) I > II > III > IV

(2) III > I > II > IV

(3) IV > III > I > II

(4) II > IV > I > III

19. The hyperconjugative stabilities of tert-butyl cation and 2-butene, respectively, are due to:

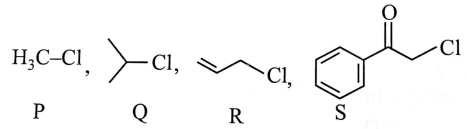
(a) $\sigma \rightarrow$ p (empty) and $\sigma \rightarrow \pi^*$ electron delocalisations.

(b) $\sigma \rightarrow \sigma^*$ and $\sigma \rightarrow \pi$ electron delocalisations.

(c) $\sigma \rightarrow$p (filled) and $\sigma \rightarrow \pi$ electron delocalisations.

(d) p(filled)$\rightarrow\sigma^*$ and $\sigma \rightarrow \pi^*$ electron delocalisations

20. Kl In acetone undergoes S_N2 reaction with each of P,Q,R and S. the rates of the reaction vary as



P Q R S

(a) P > Q > R > S

(b)S > P > R > Q

(c) P > R > Q > S

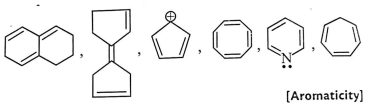
(d) R > P > S > Q

Integer base Question

21. Number of compounds among the following which contain sulphur as heteroatom is_____

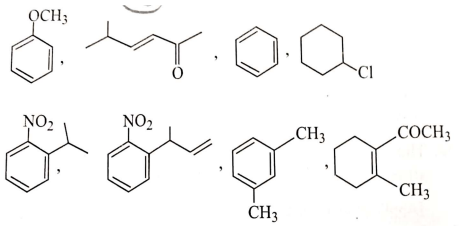
Furan, Thiophene, Pyridine, Pyrrole, Cysteine, Tyrosine

22. Number of compounds among the following which contain sulphur as heteroatom is_____

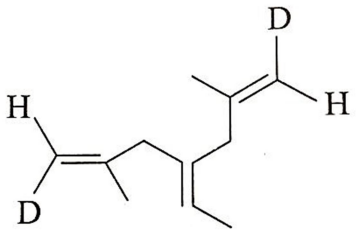


[Aromaticity]

23. How many compounds among the following compounds show inductive, mesomeric as well as hyperconjugation effects?



24. Number of geometrical isomers possible for the given structure is/ are



25. 2- chlorobutane+$Cl_2 \rightarrow C_4H_8Cl_2$(Isomers)
Total number of optically active isomers shown by $C_4H_8Cl_2$, obtained in the above reaction is_____

MATH'S

1. If the tangent at the point P on the circle $x^2 + y^2 + 6x + 6y = 2$ meets the straight line $5x - 2y + 6 = 0$ at a point Q on the y-axis, then the length of PQ is
   (A) 4
   (B) $2\sqrt{5}$
   (C) 5
   (D) $3\sqrt{5}$
2. If $a > 2b > 0$ then the positive value of m for which $y = mx - b\sqrt{1 + m^2}$ is a common tangent to $x^2 + y^2 = b^2$ and $(x - a)^2 + y^2 = b^2$ is
   (A) $\frac{2b}{\sqrt{a^2-4b^2}}$
   (B) $\frac{\sqrt{a^2-4b^2}}{2b}$
   (C) $\frac{2b}{a-2b}$
   (D) $\frac{b}{a-2b}$
3. The radius of the circle, having centre at (2, 1), whose one of the chord is a diameter of the circle $x^2 + y^2 - 2x - 6y + 6 = 0$
   (A) 1
   (B) 2
   (C) 3
   (D) $\sqrt{3}$)
4. A circle is given by $x^2 + (y - 1)^2 = 1$ another circle C touches it externally and also the x-axis, then the locus of its centre is
   (A) $\{(x, y) : x^2 = 4y\} \cup \{(x,y): y \leq 0\}$
   (B) $\{(x, y) : x^2 + (y - 1)^2 = 4\} \cup (x,y): y \leq 0\}$
   (C) $\{(x, y)\ x^2 = y\} \cup (0,y): y \leq 0\}$
   (D) $\{(x, y)\ x^2 = 4y\} \cup (0,y): y \leq 0\}$
5. Let ABCD be a quadrilateral with area 18, with side AB parallel to the side CD and AB = 2CD Let AD be perpendicular to AB and CD. If a circle is drawn inside the quadrilateral ABCD touching all the sides, then its radius is
   (A) 3
   (B) 2
   (C) 3/2
   (D) 1
6. Three vertices of a parallelogram taken in order are (-1,-6) (2,-5) and (7,2) the fourth vertex is
   (A) (1,4) (B) (4,1)
   (C) (1,1) (D) (4,4)
7. If the circle $x^2+y^2-2gx+6y-19c = 0$, g, c ∈ R passes through the point (6,1) and its center lies on the line x-2cy = 8, then the length of intercept made by the circle on x-axis is
   (A) $\sqrt{11}$ (B) 4
   (C) 3 (D) $2\sqrt{23}$
8. Let O be the origin and OP and OQ be the tangents to the circle $x^2 + y^2 - 6x + 4y + 8 = 0$ at the points P and Q on it. If the circumcircle of the triangle OPQ passes through the point $\left(\alpha, \frac{1}{2}\right)$, then a value of α is
   (A) 1 (B) $-\frac{1}{2}$
   (C) $\frac{3}{2}$ (D) $\frac{5}{2}$
9. If the length of the chord of the circle, $x^2+y^2 = r^2$ $(r > 0)$ along the line $y-2x = 3$ is r then r^2 is equal to
   (A) $\frac{9}{5}$ (B) $\frac{12}{5}$
   (C) 12 (D) $\frac{24}{5}$
10. A point p moves on the line 2x-3y+4=0 If Q (1,4) and R(3,-2) are fixed points then the locus of the centroid of ΔPQR *is a line*
    (A) parallel to x- axis
    (B) with slope $\frac{2}{3}$
    (C) with slope $\frac{3}{2}$
    (D) Parallel to y-axis
11. A rectangle is inscribed in a circle with a diameter lying along the line 3y= x+7. If the two adjacent vertices of the rectangle are(-8,5) and 6,5), then the area of the rectangle (in sq.units) is
    (A) 98 (B) 84
    (C) 56 (D) 72
12. Let (α, β) be the centroid of the triangle formed by the lines 15x – y = 82,6x -5y = - 4 and 9x + 4y= 17. Then $\alpha + 2\beta$ and $2\alpha - \beta$ are the roots of the equation
    (A) x^2-7x+12=0
    (B) x^2-14x+48=0
    (C) x^2-10x+25=0

(D) x^2-13x+42=0

13. Let k be an integer such that triangle with vertices (*k,-3k*), (*5,K*) and (*-k,2)* has area 28sq. units then the orthocentre of this triangle is at the point
    (a) (2,1/2)
    (B) (2,-1/2)
    (C) (1, 3/4)
    (D) (1, 3/4)
14. If x_1, x_2,x_3 and y_1, y_2 ,y_3 are both in G.P. with the same common ratio, then the points (x_1, y_1) (x_2, y_2) and (x_3, y_3)
    (a) lie on a straight line.
    (b) lie on an ellipse.
    (c) lie on a circle.
    (d) are the vertices of a triangle.
15. The locus of the centroid of the triangle whose vertices are (a cos t,a sin t) (b sin t, - b cos t) and (1, 0), where t is a parameter, is
    (a) $(3x - 1)^2 + (3y)^2 = a^2 - b^2$
    (b) $(3x - 1)^2 + (3y)^2 = a^2 + b^2$
    (c) $(3x + 1)^2 + (3y)^2 = a^2 + b^2$
    (d) $(3x + 1)^2 + (3y)^2 = a^2 - b^2$
16. The x-coordinate of the incentre of the triangle that has the coordinates of midpoints of its sides as (0, 1) (1, 1) and (1,0) is:
    (a) $2 + \sqrt{2}$
    (b) $2 - \sqrt{2}$
    (c) $1 + \sqrt{2}$
    (d) $1 - \sqrt{2}$
17. The number of points having both coordinates as integers, that lie in the interior of the triangle with vertices (0, 0). (0, 41) and (41, 0) is
    (a) 901
    (b) 861
    (c) 820
    (d) 780
18. A line passes through (2, 2) and is perpendicular to the line 3x + y = 3. Its y- intercept is
    (a) 1/3 (b) 2/3
    (c) 1 (d) 4/3
19. The line x + y = 4 divides the line joining the points (-1, 1) and (5, 7) in the ratio
    (a) 3:1
    (b) 1:2
    (c) 1:2 externally
    (d) None of these
20. Let A(6, 3) B(- 3, 5) C(4,- 2) and D(x, 3x) be four points. If the ratio of area of ΔDBC and ΔABC is 1: 2, then the value of x is
    (a) 11/8
    (b) 8/11
    (c) 3
    (d) None of these
21. Two circles in the first quadrant of radii r_1 and r_2 touch the coordinate axes .Each of them cuts off an intercept of 2 units with the line x+y = 2. Then $r_1^2+r_2^2 - r_1r_2$ is equal to_____
22. The number of integral values of k for for which the line ,*3x + 4y = k* intersects the circle, x^2+y^2 - *2x - 4y + 4 = 0* at two distinct points is
23. Consider a circle $(x-\alpha)^2+(y-\beta)^2= 50$, Where $\alpha, \beta > 0$. If the circle touches the line y+x=0 at the point P, whose distance from the origin is $4\sqrt{2}$, then $(x-\alpha)^2$ is equal to _____
24. Let AD and BC be two vertical poles at A and B respectively On a horizontal ground. If AD =8 m Bc =11 m and AB =10m; then the distance (in meters) of a point M on AB from the point A such that MD^2+MC^2 is minimum is_____
25. The number of integral values of m, for which the *x*-coordinate of the point of intersection of the lines *3x + 4y = 9* and *y = mx + 1* is also an integer, is