Model Question of HSC Examination 2017 for All Board

Subject Code | 2 | 6 | 6 |

(English Version)

Subject : Higher Mathematics 2nd Paper (Creative)

Time : 2 Hours 30 Minutes **Full Marks —50**

[Taking at least two questions from each group. Answer five questions of the following.]

Group-A

1. i. $Z_1 = 1 + 3i$, $Z_2 = 2 - i$ are two vomplex number.
   ii. $x + y - 6 \leq 0$ and $2x - y - 4 \geq 0$

   a. Find the argument of $\bar{Z}_1$. 2
   b. Find the square root of Z_1Z_2. 4
   c. From the stem (ii), Draw the graph of the solution set or feasible region of the pair of inequalities. 4

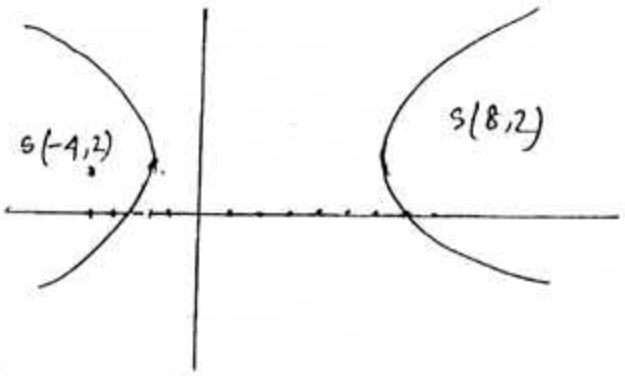
2. $f(x) = x^4 - 6x^3 + 10x^2 + 2x - 15$.
   a. If x is real, find the maximum value of $-9x^2 + 6px + q^2$. 2
   b. If one root of $f(x) = 0$ is $2 + i$, then find the other roots of $f(x) = 0$. 4
   c. Find the equation whose roots be increased by 1 from each root of $f(x) = 0$. 4

3. $(1+x)^n$ is a binomial expression.
   a. Find the co-efficient of x^r in the expansion of
   $(1-2x + 3x^2-4x^3+....)^{\frac{1}{2}}$. 2
   b. In the stem if $n \in N$ and the co-efficients of three consecutive terms in the expansion of given expression be in the ratio 1: 5 : 15 then find the value of n. 4
   c. If $|x| < 1$ and $n = \frac{1}{2}$ then the series by expanding of the expression be convergent. 4

4. Stem i : $3\tan\theta + 2\sec\theta = 1$ whose two roots α and β.
   Stem ii : $\text{Cot}^{-1}x + \cot^{-1} y + \cot' z = \pi$
   a. Prove that $\cot \cos^{-1} \sin \tan^{-1}\left(\frac{1}{2}\right) = \frac{1}{2}$ 2
   b. From stem ii, Prove that $-xy + yz + zx = 1$. 4
   c. From stem i, Prove that $\tan(\alpha + \beta) = \frac{3}{4}$. 4

Group-B

5.

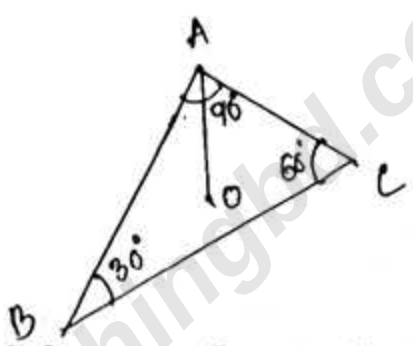


a. The focal distance of any point on the parabola $y^2 = 4x$. is 6; Find the co-ordinates of the point. 2

b. Find the equation of the hyperbola whose foci are s and s′ and i centricity = 1.5. 4

c. In the stem, taking the vertices of the hyperbola as vertices of the ellipse whose eccentricity is $\frac{1}{2}$, find the length of the Latus rectum of the ellipse. 4

6.



Stem i : Three equal forces of magnitudes 5 unit act at a point parallel to the sides BC, CA and AB of a triangle ABC.

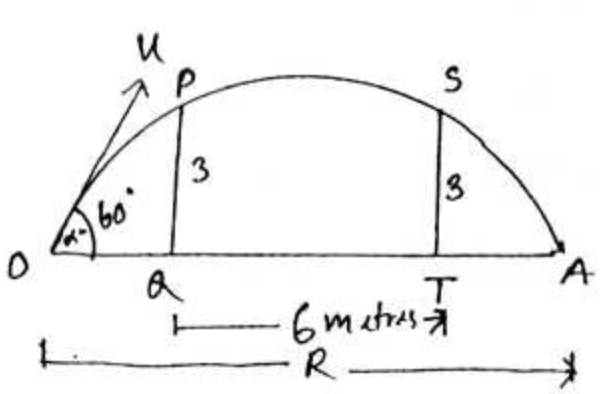
Stem ii : O is the circumcentre of the triangle ABC. A forc of 10N acts along AO.

a. Forces 5N, 7N and 8N acting on a Particle are in equilibrium. Find the angle between the forces 8N and 5N.2

b. From stem i, find the magnitude of their resultant of the forces. 4

c. From the stem (ii), find the parallel components of the force 10N acting at B and C. 4

7.



A body is projected at an angle $\alpha = 60°$ to the horizon so as just to pass two walls of equal height PQ = ST = 3. metres at a distance of QT = 6 metres.

a. Show that the resultant of two equal velocit bisects the angle between them. 2

b. Find the horizontal range R of the body. 4

c. Find the velocity of the body at P. 4

8. (i) The scores of two cricketers in ten innings are following.

A	111	48	16	2	73	0	110	5	39	11
B	15	24	0	28	10	116	29	20	46	51

(ii) A coin is thrown 7 times.

a. A dice is thrown two times. Find the probability of same digit appears on the top of both the dice. 2

b. From stem (ii) find the probability of at least 3 head. 4

c. From stem i finding coefficient of variation compare the efficiency of two cricketers A and B. 4

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(English Version)

Subject : Higher Mathematics 2nd Paper (MCQ)

Time : 25 Minutes **Full Marks—25**

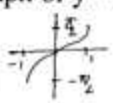
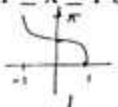
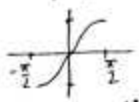
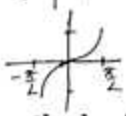
[Darken the circle (O) with black ball point pen from the alternatives]

1. Zero 'O' is a—
   ⓐ Positive number ⓑ Negative number
   ⓒ Nutral number ⓓ Natural number

2. Solution of $|x| \geq 3$ be—
   ⓐ $(-\infty, -3] \cup [3, \infty)$ ⓑ $(-\infty, -3) \cup (3, \infty)$
   ⓒ $(-\infty, -3) \cap [3, \infty)$ ⓓ $(-\infty, -3) \cap (3, \infty)$

3. $1 - \frac{i}{1-\frac{1}{1+i}} = ?$
   ⓐ $-i$ ⓑ i ⓒ 1 ⓓ -1

4. Asymtotes of hyperbola $\frac{y^2}{3} - \frac{x^2}{4} = 1$ be—
   ⓐ $2y = \pm\sqrt{3}x$ ⓑ $\sqrt{3}y = \pm 2x$
   ⓒ $3y = \pm 4x$ ⓓ $4y = \pm 3x$

5. Graph of $y = \cos^{-1}x$, $x \in R$, $-1 \leq x \leq 1$ be—
   ⓐ 
   ⓑ 
   ⓒ 
   ⓓ 

Answer question 6 and 7 on the basis of following stem:

$\frac{x^2}{3} + \frac{y^2}{2} = 1$ is an equation of ellipse.

6. Length of Latus rectum—
   ⓐ $\frac{4}{\sqrt{3}}$ ⓑ $\frac{6}{\sqrt{2}}$ ⓒ $\frac{4}{3}$ ⓓ 3

7. Eccentricity be—
   ⓐ $\frac{1}{3}$ ⓑ $\frac{5}{9}$ ⓒ $\frac{1}{\sqrt{3}}$ ⓓ $\frac{2}{3}$

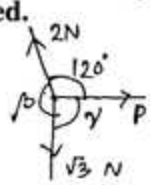
8. $\text{cosec}^2(\tan^{-1}\frac{1}{2}) = ?$
   ⓐ 3 ⓑ 4 ⓒ 5 ⓓ 8

9. Fundamental period of $\cos\frac{\theta}{2}$ be—
   ⓐ 6π ⓑ 2π ⓒ π ⓓ $\frac{\pi}{2}$

10. Two dice is thrown in at a time. Probability of two six on the both dice be—
    ⓐ $\frac{1}{6}$ ⓑ $\frac{1}{36}$ ⓒ $\frac{1}{12}$ ⓓ $\frac{1}{18}$

11. If $y = 2x + c$ touches the parabola $y^2 = -4x$ then value of C be—
    ⓐ $-\frac{1}{2}$ ⓑ $\frac{1}{2}$ ⓒ -2 ⓓ 2

On the basis of the following stem, question no. 12 & 13 can be solved.



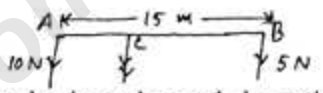
12. $\gamma = ?$
    ⓐ 90° ⓑ 150° ⓒ 110° ⓓ 120°

13. Value of the force P be?
    ⓐ $7\frac{1}{2}$ N ⓑ 7N ⓒ $\frac{\sqrt{3}}{2}$ N ⓓ 1N

14. Value of the middle term in the expansion of $\left(x - \frac{1}{x}\right)^8$ be—
    ⓐ ${}^8C_4$ ⓑ ${}^8C_3$ ⓒ ${}^8C_5$ ⓓ ${}^8C_6$

15. A particle be projected with initial velocity 30 m/sec. Whose horizontal range 60 metres then angle of the projection be—
    ⓐ 20.39° ⓑ 25° ⓒ 30° ⓓ 32.35°

16. i. Two parallel force be like and unlike
    ii. Magnitude of two like parallel force P and Q (P>Q) whose resultant be P–Q
    iii. Magnitude of the resultant of two unlike parallel force $\overline{P}$ and $\overline{P}$ be 2p
    Which is correct of the following?
    ⓐ i & ii ⓑ i & iii ⓒ ii & iii ⓓ i, ii & iii

17. 

    If the forces be interchanged the point of action of resultant displaced along AB through a distanced then d = ?
    ⓐ 3 metres ⓑ 5 metres
    ⓒ 7 metres ⓓ 10 metres

18. The equation $5x^2 + 15x - 10y - 4 = 0$ is—
    ⓐ Parabola ⓑ Ellipse ⓒ Hyperbola ⓓ Circle

19. For $x \in R$, the minimum value of $x^2 - 3x + 1$ be—
    ⓐ $\frac{5}{4}$ ⓑ $\frac{3}{2}$ ⓒ 1 ⓓ $-\frac{5}{4}$

20. In the conic $y^2 = -2x$
    i. co-ordinats of focus $\left(-\frac{1}{2}, 0\right)$
    ii. Equation of directrix $2x - 1 = 0$
    iii. Length of Latus rectum is 4 unit
    Which is correct of the following?
    ⓐ i & ii ⓑ i & iii ⓒ ii & iii ⓓ i, ii & iii

21. CO.M.D of 2, 4 6 be—
    ⓐ $0.33^{\overline{|x|}}$ ⓑ 0 ⓒ 0.67 ⓓ 33

22. $5x - x^2 - 6 > 0$ then—
    ⓐ $x < 2$ ⓑ $2 > x > 3$
    ⓒ $2 < x < 3$ ⓓ $x > 3, x < 2$

23. x and y co-prime and $\frac{x}{y} \in N$ then value of y be—
    ⓐ 1 ⓑ 0 ⓒ 2 ⓓ 3

24. measurement of population—
    i. Rational number ii. Natural number
    iii. Imaginary number
    Which is the true of the following
    ⓐ i & ii ⓑ i & iii ⓒ ii & iii ⓓ i, ii & iii

25. Domain of $\sec^{-1}x$ be—
    ⓐ $(-\infty, -1) \cup (1, \pm\infty)$ ⓑ $(-\infty, +\infty)$
    ⓒ $(-1, 1)$ ⓓ $[-1, 1]$