A.P. Intermediate Board Mathematics IA Model Paper

(Extracted from https://bieap.apcfss.in)

Mathematics Paper - I(A)

Time : 3 Hours | *Max. Marks : 75*

SECTION - A

I. Very Short Answer Type Questions : ***10 × 2 = 20***

*(i) Answer **ALL** questions.*

*(ii) Each question carries **TWO** marks.*

1. *If A = (–2, –1, 0, 1, 2) and f : A → B is a surjection defined by f(x) =* x^2 *+ x + 1 then find B.*

2. *Find the domain of the real valued function f(x) = log (*x^2*– 4x + 3).*

3. *Define trace of matrix. Find the trace of A if A =* $\begin{bmatrix} 1 & 2 & -\frac{1}{2} \\ 0 & -1 & 2 \\ -\frac{1}{2} & 2 & 1 \end{bmatrix}$.

4. *Find the Rank of* $\begin{bmatrix} -1 & -2 & -3 \\ 3 & 4 & 5 \\ 4 & 5 & 6 \end{bmatrix}$.

5. *If the vectors* $-3\bar{i} + 4\bar{j} + \lambda\bar{k}$ *and* $\mu\bar{i} + 8\bar{j} + 6\bar{k}$ *are collinear vectors, then find* λ *and* μ.

6. *Find the vector equation of the line joining the points* $2\bar{i} + \bar{j} + 3\bar{k}$ *and* $-4\bar{i} + 3\bar{j} - \bar{k}$.

7. *If* $\bar{a} = 2\bar{i} - 3\bar{j} + 5\bar{k}$, $\bar{b} = -\bar{i} + 4\bar{j} + 2\bar{k}$ *then find* $\bar{a} \times \bar{b}$ *and unit vector perpendicular to both* $\bar{a}$ *and* $\bar{b}$.

8. *Find the period of the function tan (x + 4x + 9x + ... +* n^2*x) where n is any positive integer.*

9. *Find the maximum and minimum values of 3 sin x – 4 cos x.*

10. *Show that* $tanh^{-1}(\frac{1}{2}) = \frac{1}{2}\log_e 3$.

SECTION - B

II. *Short Answer Type Questions :* **5 × 4 = 20**

*(i) Answer **ANY FIVE** questions.*

*(ii) Each question carries **FOUR** marks.*

11. *If I =* $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ *and E =* $\begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix}$, *then show that*

$(aI + bE)^3 = a^3 I + 3a^2 bE$,

where I is unit matrix of order 2.

12. *Let ABCDEF be a regular hexagon with centre 'O', show that*

$\overline{AB} + \overline{AC} + \overline{AD} + \overline{AE} + \overline{AF} = 3\,\overline{AD} = 6\,\overline{AO}$.

13. $\bar{a} = 2\bar{\imath} + \bar{\jmath} - \bar{k}$, $\bar{b} = -\bar{\imath} + 2\bar{\jmath} - 4\bar{k}$, *and* $\bar{c} = \bar{\imath} + \bar{\jmath} + \bar{k}$, *then find*

$(\bar{a} \times \bar{b}) . (\bar{b} \times \bar{c})$.

14. *Find the value of* $sin^2 \frac{\pi}{10} + sin^2 \frac{4\pi}{10} + sin^2 \frac{6\pi}{10} + sin^2 \frac{9\pi}{10}$.

15. *Prove that :* $\frac{1}{\sin 10°} - \frac{\sqrt{3}}{\cos 10°} = 4$.

16. *If sin x + sin y =* $\frac{1}{4}$ *and cos x + cos y =* $\frac{1}{3}$ *then show that*

(i) tan $(\frac{x+y}{2}) = \frac{3}{4}$ *(ii) cot (x + y) =* $\frac{7}{24}$.

17. *In ΔABC, prove that cot A + cot B + cot C =* $\frac{a^2+b^2+c^2}{4\Delta}$.

SECTION - C

III. *Long Answer Type Questions :* **5 × 7 = 35**

*(i) Answer **ANY FIVE** questions.*

*(ii) **Each** question carries **SEVEN** marks.*

18. *If f = {(4, 5), (5, 6),(6, –4}) and g = {(4, –4), (6, 5), (8, 5)} then find*

(i) f + g *(ii) f – g* *(iii) 2f + 4g* *(iv) f + 4*

(v) fg *(vi) f/g* *(vii) |f|.*

19. *If A =* $\begin{bmatrix} 3 & -3 & 4 \\ 2 & -3 & 4 \\ 0 & -1 & 1 \end{bmatrix}$, *then show that* $A^{-1} = A^3$.

20. *Solve the following simultaneous linear equations by using Cramer's rule*

x + y + z = 1, 2x + 2y + 3z = 6, x + 4y + 9z = 3.

21. *Show that the line joining the pair of points* $6\bar{a} - 4\bar{b} + 4\bar{c}$, $-4\bar{c}$ *and the line joining the pair of points* $-\bar{a} - 2\bar{b} - 3\bar{c}$, $\bar{a} + 2\bar{b} - 5\bar{c}$ *intersect at the point* $-4\bar{c}$ *when* $\bar{a}$, $\bar{b}$, $\bar{c}$ *are non-coplanar vectors.*

22. *If* $\bar{a} = 2\bar{\imath} + 3\bar{\jmath} + 4\bar{k}$, $\bar{b} = \bar{\imath} + \bar{\jmath} - \bar{k}$ *and* $\bar{c} = \bar{\imath} - \bar{\jmath} + \bar{k}$, *then compute* $\bar{a} \times (\bar{b} \times \bar{c})$ *and verify that it is perpendicular to* $\bar{a}$ *.*

23. *If A + B + C = π then prove that*

$$cos^2\frac{A}{2} + cos^2\frac{B}{2} + cos^2\frac{C}{2} = 2(1 + \sin\frac{A}{2}\sin\frac{B}{2}\sin\frac{C}{2}).$$

24. *If ΔABC if a = 13, b = 14, c = 15, show that* $R = \frac{65}{8}$, $r = 4$, $r_1 = \frac{21}{2}$, $r_2 = 12$ *and* $r_3 = 14$.