BOARD OF INTERMEDIATE EDUCATION (AP)

HALF YEARLY EXAMINATIONS - 2021

SENIOR INTER MATHEMATICS - IIB

MODEL PAPER - 2 (English Version)

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

SECTION - A

Note: i) Very short answer type questions.   **$10 \times 2 = 20$**

    ii) Answer All questions.

    iii) Each question carries 2 marks.

1. Find the equation of the circle passing through $(-2, 3)$ and having centre at $(0, 0)$.

2. Find the length of the tangent from the point $(-2, 5)$ to the circle $x^2 + y^2 = 25$.

3. Find the parametric equation of the circle $(x - 3)^2 + (y - 4)^2 = 8^2$.

4. Find k, if the circles $x^2 + y^2 + 4x + 8 = 0$, $x^2 + y^2 - 16y + k = 0$ cut each other orthogonally.

5. Find the equation the radical axis of the two circles $2x^2 + 2y^2 + 3x + 6y - 5 = 0$ and

   $3x^2 + 3y^2 - 7x + 8y - 11 = 0$.

6. Evaluate $\int \dfrac{1}{\cosh x + \sinh x} \, dx \ (x \in \mathbb{R})$

7. Evaluate $\int \left(\dfrac{1}{1 - x^2} + \dfrac{1}{1 + x^2} \right) dx, x \in (-1, 1)$

8. Evaluate $\int e^x (\sin x + \cos x) \, dx$

9. Evaluate $\int_2^3 \dfrac{2x}{1 + x^2} \, dx$

10. Evaluate $\int_0^{\pi/2} \dfrac{\sin^5 x}{\sin^5 x + \cos^5 x} \, dx$

SECTION - B

Note: i) Short answer type questions.   **$5 \times 4 = 20$**

    ii) Answer any Five questions.

    iii) Each question carries 4 marks.

11. Show that the line $x + y + 1 = 0$ touches the circle $x^2 + y^2 - 3x + 7y + 14 = 0$ and find the point of contact.

12. Find the pole of $x + y + 2 = 0$ with respect to the circle $x^2 + y^2 - 4x + 6y - 12 = 0$.

13. Find the area of the triangle formed by the normal at $(3, -4)$ to the circle $x^2 + y^2 - 22x - 4y + 25 = 0$ with the coordinate axes.

14. If $x + y = 3$ is the equation of the chord AB of the circle $x^2 + y^2 - 2x + 4y - 8 = 0$, find the equation of the circle AB as diameter.

15. Find the equation and length of the common chord of the circles $x^2 + y^2 + 2x + 2y + 1 = 0$, $x^2 + y^2 + 4x + 3y + 2 = 0$.

16. Find the equation of the circle which cuts the circles $x^2 + y^2 - 4x - 6y + 11 = 0$, $x^2 + y^2 - 10x - 4y + 21 = 0$ orthogonally and has the diameter along the line $2x + 3y = 7$.

17. Evaluate $\int_0^4 (16 - x^2)^{5/2} \, dx$

SECTION - C

Note: i) Long answer type questions.   **$5 \times 7 = 35$**

   ii) Answer any Five questions.

   iii) Each question carries 7 marks.

18. If $(2, 0)$, $(0, 1)$ $(4, 5)$ and $(0, c)$ are concyclic, then find c.

19. Find the equation of the circle which passes through the vertices of the triangle formed by the lines $x + y + 1 = 0$, $3x + y - 5 = 0$, $2x + y - 5 = 0$.

20. Evaluate $\int \dfrac{\cos x + 3 \sin x + 7}{\cos x + \sin x + 1} \, dx$

21. Obtain the reduction formula for $I_n = \int \operatorname{cosec}^n x \, dx$, n being a positive integer, $n \geq 2$ and deduce the value of $\int \operatorname{cosec}^5 x \, dx$.

22. Evaluate $\displaystyle\int_0^{\pi/4} \dfrac{\sin x + \cos x}{9 + 16 \sin 2x} \, dx$

23. Evaluate $\displaystyle\int_0^{\pi/2} \dfrac{\sin^2 x}{\sin x + \cos x} \, dx$

24. Evaluate $\displaystyle\int_a^b \sqrt{(x - a)(b - x)} \, dx$

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