BOARD OF INTERMEDIATE EDUCATION (AP)

HALF YEARLY EXAMINATIONS - 2021

SENIOR INTER MATHEMATICS - IIB

MODEL PAPER (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 for which the points (4, 2) and (1, 5) are the end points of a diameter.

2. Find the value of 'k' if the points (4, 2) and (k, −3) are conjugate points with respect to the circle $x^2 + y^2 − 5x + 8y + 6 = 0$.

3. Find the equation of the normal of P(3, 5) to the circle $x^2 + y^2 − 10x − 2y + 6 = 0$.

4. Find the angle between the circles $x^2 + y^2 + 4x − 14y + 28 = 0$ and $x^2 + y^2 + 4x − 5 = 0$.

5. Find the equation of the radical axis of the circles $x^2 + y^2 + 4x + 6y − 7 = 0$,

$4(x^2 + y^2) + 8x + 12y − 9 = 0$.

6. Evaluate $\int \dfrac{e^x(1 + x)}{\cos^2(x\, e^x)}\, dx$

7. Evaluate $\int \dfrac{1}{(x + 1)(x + 2)}\, dx$

8. Evaluate $\int \dfrac{\sin^4 x}{\cos^6 x}\, dx$

9. Evaluate $\int_0^1 \dfrac{dx}{\sqrt{3 − 2x}}$

10. Evaluate $\int_0^{\pi/2} \sin^6 x \cos^4 x\, dx$

SECTION - B

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

    ii) Answer any Five questions.

    iii) Each question carries 4 marks.

11. Find the length of the chord intercepted by the circles $x^2 + y^2 − x + 3y − 22 = 0$ on the line $y = x − 3$.

12. If a point P is moving such that the lengths of tangents drawn from P to the circles

$x^2 + y^2 − 4x − 6y − 12 = 0$ and $x^2 + y^2 + 6x + 18y + 26 = 0$ are in the ratio 2 : 3. Then find the equation of the locus of P.

13. Find the equation of the circle with centre (−2, 3) cutting a chord of length 2 units on $3x + 4y + 4 = 0$.

14. Find the equation of the circle which passes through (0, 0) and intersects the circle

$x^2 + y^2 − 4x + 6y + 10 = 0$, $x^2 + y^2 + 12y + 6 = 0$ orthogonally.

15. Find the equation of the circle passing through the points of intersection of the circles

$x^2 + y^2 - 8x - 6y + 21 = 0$, $x^2 + y^2 - 2x - 15 = 0$ and (1, 2).

16. Find the radical centre of three circles $x^2 + y^2 - 4x - 6y + 3 = 0$, $x^2 + y^2 - 2x - 4y - 1 = 0$ and

$x^2 + y^2 - 6x - 2y = 0$

17. Evaluate $\displaystyle\int_{0}^{\pi/2} \frac{1}{4 + 5 \cos x} \, dx$

SECTION - C

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

ii) Answer any Five questions.

iii) Each question carries 7 marks.

18. Show that the following four points (1, 1), (−6, 0), (−2, 2), (−2, −8) are concyclic and find the equation of the circle on which they lie.

19. Find the equation of circle passing through (2, −3), (−4, 5) and centre lies on $4x + 3y + 1 = 0$.

20. Evaluate $\displaystyle\int \frac{9 \cos x - \sin x}{4 \sin x + 5 \cos x} \, dx$

21. If $I_n = \displaystyle\int \cos^n x \, dx$ then show that $I_n = \dfrac{\cos^{n-1} x \sin x}{n} + \dfrac{n-1}{n} I_{n-2}$ deduce the value of $\displaystyle\int \cos^5 x \, dx$.

22. Evaluate $\displaystyle\int_{0}^{\pi/4} \log(1 + \tan x) \, dx$

23. Show that $\displaystyle\int_{0}^{\pi/2} \frac{x}{\sin x + \cos x} \, dx = \frac{\pi}{2\sqrt{2}} \log(\sqrt{2} + 1)$

24. Evaluate $\displaystyle\int_{0}^{\pi} \frac{x \sin x}{1 + \cos^2 x} \, dx$

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