BOARD OF INTERMEDIATE EDUCATION, A.P.

Mathematics - IIB

Model Question Paper (w.e.f. 2013-14)

Note: This Question paper consists of three sections A. B and C.

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

SECTION – A

I. Very Short Answer type Questions

(i) Answer all Questions

(ii) Each Question carries 2 marks 10 x 2 = 20

1. If $ax^2 + bxy + 3y^2 - 5x + 2y - 3 = 0$ represents a circle, find the values of a and b. Also find its radius and centre.
2. State the necessary and sufficient condition for $lx + my + n = 0$ to be a, normal to the circle $x^2 + y^2 + 2gx + 2fy + c = 0$
3. Find the angle between the circles $x^2 + y^2 - 12x - 6y + 41 = 0$ and $x^2 + y^2 + 4x + 6y - 59 = 0$
4. Find the equation of the parabola whose focus is S(1, -7) and vertex is A(1, -2).
5. Find the angle between the asymptotes of the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$.
6. Evaluate $\int \frac{1}{(x+3)\sqrt{x+2}} dx$
7. Evaluate $\int \frac{\sin^4 x}{\cos^6 x} dx$
8. Evaluate $\int_0^1 \frac{x^2}{x^2+1} dx$
9. Evaluate $\int_0^{\pi} \frac{\sin^2 x - \cos^2 x}{\sin^3 x + \cos^3 x} dx$
10. Find the order and degree of the differential equation $\left[\frac{d^2y}{dx^2} - \left(\frac{dy}{dx}\right)^3\right]^{6/5} = 6y$.

SECTION – B

II. Short Answer type Questions
(i) Answer any five Questions
(ii) Each Question carries 4 marks 5 x 4 = 20

11. Show that the tangent at (–1, 2) of circle $x^2 + y^2 - 4x - 8y + 7 = 0$ touches the circle $x^2 + y^2 + 4x + 6y = 0$. Also find its point of contact.
12. 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).
13. Find the length of major axis, minor axis, latus rectum, eccentricity of the ellipse $9x^2 + 16y^2 = 144$.
14. Show that the point of intersection of the perpendicular tangents to an ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$, $(a > b)$ lies on a circle.
15. Find the equation of the tangents to the hyperbola $3x^2 - 4y^2 = 12$ which are (i) Parallel to (ii) Perpendicular to the line $y = x - 7$.
16. Find the reduction formula for $\int_0^{\frac{\pi}{2}} \sin^n x\,dx$
17. Solve: $(1 + y^2)\,dx = (\text{Tan}^{-1}\, y - x)dy$

SECTION – C

III. Long Answer type Questions
(i) Answer any five Questions
(ii) Each Question carries 7 marks 5 x 7 = 35

18. Show that the points (1, 1), (–6, 0), (–2, 2) and (–2, –8), are concyclic.
19. Find the direct common tangents to the circles
$x^2 + y^2 + 22x - 4y - 100 = 0$, $x^2 + y^2 - 22x + 4y + 100 = 0$.
20. If y_1, y_2, y_3 are the y-coordinates of the vertices of the triangle in the parabola $y^2 = 4ax$ then show that the area of the triangle is
$\frac{1}{8a}|(y_1 - y_2)(y_2 - y_3)(y_3 - y_1)|$ square units.
21. Evaluate $\int \frac{9\cos x - \sin x}{4\sin x + 5\cos x}$
22. Evaluate $\int \frac{dx}{(1+x)\sqrt{3 + 2x - x^2}}$
23. Evaluate $\int_0^1 \frac{\log(1+x)}{1+x^2}\,dx$
24. Solve: $\frac{dy}{dx} = \frac{2x + y + 3}{2y + x + 1}$

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