

# 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  $\left[ \frac{d^2 y}{dx^2} - \left( \frac{dy}{dx} \right)^3 \right]^{6/5} = 6y$ .

## 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:  $(1 + y^2) dx = (\tan^{-1} y - x)dy$

## 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  $\int \frac{9 \cos x - \sin x}{4 \sin x + 5 \cos x} dx$
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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