

**Board of Intermediate Education (AP)**

Held on 13-03-2020

**293**

Total No. of Questions – 24

Regd.

Total No. of Printed Pages – 3

No.

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**Part – III**
**MATHEMATICS, Paper-II(B)**  
**(English Version)**
*Time : 3 Hours]**[Max. Marks : 75*

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

**SECTION – A****10 × 2 = 20****I. Very short answer type questions :**

- (i) Attempt all questions.  
(ii) Each question carries two marks.

- Find the other end of the diameter of the circle  $x^2 + y^2 - 8x - 8y + 27 = 0$  if one end of it is (2, 3).
- Define chord of contact and find the chord of contact of (1, 1) to the circle  $x^2 + y^2 = 9$ .
- Find k if the circles  $x^2 + y^2 - 5x - 14y - 34 = 0$  and  $x^2 + y^2 + 2x + 4y + k = 0$  are orthogonal.
- Find the equation of the parabola whose vertex is (3, -2) and focus is (3, 1).
- If  $3x - 4y + k = 0$  is a tangent to the hyperbola  $x^2 - 4y^2 = 5$ , find the value of k.

6. Evaluate :  $\int \frac{\cos x}{(1+\sin x)^2} dx$ .



7. Evaluate :  $\int x \log x \, dx$  on  $(0, \infty)$ .
8. Evaluate :  $\lim_{n \rightarrow \infty} \frac{1 + 2^4 + 3^4 + \dots + n^4}{n^5}$
9. Find :  $\int_{-\pi/2}^{\pi/2} \sin^2 x \cos^4 x \, dx$ .
10. Solve :  $y(1 + x) \, dx + x(1 + y) \, dy = 0$ .

## SECTION - B

5 × 4 = 20

## II. Short answer type questions :

(i) Attempt any five questions.

(ii) Each question carries four marks.

11. Find the area of the triangle formed by the tangent at  $P(x_1, y_1)$  to the circle  $x^2 + y^2 = a^2$  with the co-ordinate axes where  $x, y, \neq 0$ .
12. If the two circles  $x^2 + y^2 + 2gx + 2fy = 0$  and  $x^2 + y^2 + 2g'x + 2f'y = 0$  touch each other then show that  $f'g = fg'$ .
13. S and T are the foci of an ellipse and B is one end of the minor axis. If STB is an equilateral triangle, then find the eccentricity of the ellipse.
14. Find the condition for the line  $x \cos \alpha + y \sin \alpha = P$  to be a tangent to the ellipse  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ .
15. Find the centre, foci, eccentricity, equation of the directrices of the hyperbola  $x^2 - 4y^2 = 4$ .
16. Find the area of the region bounded by the parabolas  $y^2 = 4x$  and  $x^2 = 4y$ .
17. Solve :  $(x^2 + y^2)dx = 2xy \, dy$ .

## SECTION - C

## III. Long answer type questions :

- (i) Attempt any five questions.  
 (ii) Each question carries seven marks.

18. Find the equation of the circle which passes through (4, 1), (6, 5) and having the centre on  $4x + 3y - 24 = 0$ .
19. Find the equation of the circle which touches the circle  $x^2 + y^2 - 2x - 4y - 20 = 0$  externally at (5, 5) with radius 5.
20. From an external point P tangents are drawn to the parabola  $y^2 = 4ax$  and these tangents make angles  $\theta_1, \theta_2$  with its axis, such that  $\tan \theta_1 + \tan \theta_2$  is a constant b. Then show that P lies on the line  $y = bx$ .
21. Evaluate :  $\int \frac{1}{1 + \sin x + \cos x} dx$ .
22. If  $I_n = \int \cos^n x dx$ , then show that  $I_n = \frac{1}{n} \cos^{n-1} x \sin x + \frac{n-1}{n} I_{n-2}$ .  
 (where  $n \geq 2$ )
23. Show that :  $\int_0^{\pi/2} \frac{x}{\sin x + \cos x} dx = \frac{\pi}{2\sqrt{2}} \log(\sqrt{2} + 1)$ .
24. Solve :  $x \log x \frac{dy}{dx} + y = 2 \log x$ .
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