

# T.S. Intermediate Board Mathematics IIB Model Paper

(Extracted from [tsbie.cgg.gov.in](http://tsbie.cgg.gov.in))

## Mathematics Paper - II(B)

Time : 3 Hours

Max. Marks : 75

### SECTION A

I. **Very Short Answer Type Questions :**

**10 × 2 = 20**

(i) Attempt **ALL** questions.

(ii) Each question carries **TWO** marks.

1. Find the centre and radius of the circle :

$$x^2 + y^2 - 4x - 8y - 41 = 0.$$

2. If the length of the tangent from (5, 4) to the circle

$$x^2 + y^2 + 2ky = 0$$

is 1, then find k.

3. Find the equation of the common chord of the circles :

$$x^2 + y^2 - 4x - 4y + 3 = 0 \text{ and}$$

$$x^2 + y^2 - 5x - 6y + 4 = 0.$$

4. Find the equation of the tangent to the parabola  $y^2 = 6x$  at the positive end of the latus rectum.

5. If the angle between the asymptotes of the hyperbola is  $30^\circ$ , then find its eccentricity.

6. Evaluate the integral :

$$\int \frac{\sin^2 x}{1 + \cos 2x} dx$$

on  $I \subset \mathbb{R} \setminus \{(2n \pm 1)\pi : n \in \mathbb{Z}\}$ .

7. Evaluate the integral :

$$\int \frac{2x+1}{x^2+x+1} dx, x \in \mathbb{R}.$$

8. Evaluate the definite integral :

$$\int_2^3 \frac{2x}{1+x^2} dx.$$

9. Find the area of the region enclosed by

$$y = x^3 + 3, y = 0, x = -1, x = 2.$$

10. Form the differential equation corresponding to :

$$y = A \cos 3x + B \sin 3x,$$

Where A and B are parameters.

### SECTION B

II. Short Answer Type Questions :

**5 × 4 = 20**

(i) Answer **ANY FIVE** questions.

(ii) Each question carries **FOUR** marks.

11. Find the length of the chord intercepted by the circle :

$$x^2 + y^2 - x + 3y - 22 = 0$$

on the line  $y = x - 3$ .

12. Show that the angle between the circles

$$x^2 + y^2 = a^2, x^2 + y^2 = ax + ay \text{ is } \frac{3\pi}{4}.$$

13. Find the length of latus rectum, eccentricity, foci and the equation of directrices of the ellipse :

$$9x^2 + 16y^2 = 144.$$

14. Find the equation of the tangent and normal to the ellipse

$$x^2 + 8y^2 = 33 \text{ at } (-1, 2).$$

15. Find the equations of the tangents to the hyperbola :  $3x^2 - 4y^2 = 12$   
which are :

i). Parallel and

ii). Perpendicular to the line  $y = x - 7$ .

16. Evaluate :

$$\int_{\pi/6}^{\pi/3} \frac{\sqrt{\sin x}}{\sqrt{\sin x} + \sqrt{\cos x}} dx.$$

17. Solve the differential equation :

$$(xy^2 + x)dx + (yx^2 + y)dy = 0.$$

SECTION C

III. Long Answer Type Questions :

**5 × 7 = 35**

(i) Answer **ANY FIVE** questions.

(ii) Each question carries **SEVEN** marks.

18. Find the equation of a circle which passes through (2, -3) and (-4, 5) and having the centre on  $4x + 3y + 1 = 0$ .

19. Show that :

$$\begin{aligned}x^2 + y^2 - 6x - 9y + 13 &= 0, \\x^2 + y^2 - 2x - 16y &= 0\end{aligned}$$

touch each other. Find the point of contact and the equation of common tangent at their point of contact.

20. Derive the equation of a parabola in standard form.

21. Evaluate :

$$\int \frac{dx}{(1+x)\sqrt{3+2x-x^2}} \text{ on } (-1, 3).$$

22. Obtain the reduction for

$$\int \sin^n x \, dx$$

for an integer  $n \geq 2$  and deduce the value of :

$$\int \sin^4 x \, dx.$$

23. Evaluate :

$$\int_0^1 \frac{\log(1+x)}{1+x^2} dx.$$

24. Solve the differential equation :

$$\sin^{-1}\left(\frac{dy}{dx}\right) = x + y.$$