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0293

C

Total No. of Questions—24

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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

1. Very short answer type questions :

   (*i*) Attempt **ALL** questions.

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

1. Find the equation of the circle whose centre is (–1, 2) and which passes through (5, 6).

2. If the length of the tangent from (2, 5) to the circle $x^2 + y^2 - 5x + 4y + k = 0$ is $\sqrt{37}$, then find k.

3. If the angle between the circles $x^2 + y^2 - 12x - 6y + 41 = 0$ and $x^2 + y^2 + kx + 6y - 59 = 0$ is 45°, find k.

4. Find the equation of the parabola whose vertex is (3, –2) and focus is (3, 1).

5. If $3x - 4y + k = 0$ is a tangent to $x^2 - 4y^2 = 5$, find the value of k.

6. Evaluate :

$$\int \frac{e^x}{e^x + 1} dx$$

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7. Evaluate :

$$\int \cos^3 x \sin x \, dx .$$

8. Evaluate :

$$\int_0^2 |1 - x| \, dx .$$

9. Evaluate :

$$\int_0^{\pi/2} x \sin x \, dx .$$

10. Find the general solution of $\frac{dy}{dx} = e^{x+y}$.

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 normal at (3, –4) to the circle $x^2 + y^2 - 22x - 4y + 25 = 0$ with the coordinate axes.

12. Find the equation and length of the common chord of the two circles :

$$x^2 + y^2 + 3x + 5y + 4 = 0 \text{ and}$$

$$x^2 + y^2 + 5x + 3y + 4 = 0.$$

13. Find the equation of the ellipse referred to its major and minor axes as the coordinate axes X, Y-respectively with latus rectum of length 4, and distance between foci $4\sqrt{2}$.

14. Find the eccentricity, length of latus rectum, foci and the equations of directrices of the ellipse :

$$9x^2 + 16y^2 - 36x + 32y - 92 = 0.$$

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15. Show that angle between the two asymptotes of a hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ is $2\tan^{-1}(b/a)$ (*or*) $2\sec^{-1}(e)$.

16. Find the area bounded between the curves $y = x^2$, $y = \sqrt{x}$.

17. Solve :

$$\frac{dy}{dx} + 1 = e^{x+y}.$$

SECTION C

5×7=35

III. Long answer type questions :

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

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

18. Find the equation of a circle which passes through (4, 1), (6, 5) and having the centre on :

$$4x + 3y - 24 = 0.$$

19. Show that the circles :

$$x^2 + y^2 - 6x - 9y + 13 = 0,$$

$$x^2 + y^2 - 2x - 16y = 0$$

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

20. Derive the equation of parabola in the standard form, that is $y^2 = 4ax$.

21. Evaluate :

$$\int_a^b \sqrt{(x-a)(b-x)}\, dx.$$

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7. Evaluate :

$$\int \cos^3 x \sin x \, dx .$$

8. Evaluate :

$$\int_0^2 |1 - x| \, dx .$$

9. Evaluate :

$$\int_0^{\pi/2} x \sin x \, dx .$$

10. Find the general solution of $\frac{dy}{dx} = e^{x+y}$.

SECTION B

5×4=20

II. Short answer type questions :

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

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11. Find the area of the triangle formed by the normal at (3, –4) to the circle $x^2 + y^2 - 22x - 4y + 25 = 0$ with the coordinate axes.

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