MATHS

BOOKS - VGS PUBLICATION-BRILLIANT

MATHEMATICS-II(B) MODEL PAPER 4

Section A

1. Write the parametric equations of the circle $(x-3)^2+(y-4)^2=8^2$.

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2. Find the equation of the normal at P of the

circle $S=0$ where P and S are given by

$P = (3, 5), S \equiv x^2 + y^2 - 10x - 2y + 6$

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3. Find k if the cirlces $x^2 + y^2 - 5x - 14y - 34 = 0$ and $x^2 + y^2 + 2x + 4y + k = 0$ are orthogonal to each other.

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4. Find the value of k if the line 2y=5x+k is a tangent to the parabola $y^2 = 6x$

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5. Find the centre, foci, eccentricity equation of the directrices, length of the latus rectum of the hyperbola.

$16y^2 - 9x^2 = 144$

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6. $\int \frac{\sin\left(\tan^{-1} x\right)}{1+x^2} dx, x \in R.$

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7. Evaluate the integerals.

$\int e^x \left(\frac{1 + x\log x}{x}\right) dx on (0, \infty).$

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8. Evaluate the definite integrals .

$\int_0^{\pi} \sqrt{2 + 2\cos\theta} d\theta$

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9. Find $\int_{-\pi/2}^{\pi/2} \sin^2 x \cos^4 x dx$

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10. $x^{\frac{1}{2}}\left(\frac{d^2y}{dx^2}\right)^{\frac{1}{3}} + x.\frac{dy}{dx} + y = 0$ has order 2 and degree 1. Prove.

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Section B

1. Find the length of the chord intercepted

by the circle $x^2 + y^2 - x3y - 22 = 0$ on

the line $y = x - 3$

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2. Find the radical centre of the following circles

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

$x^2 + y^2 - 2x - 4y - 1 = 0$

$x^2 + y^2 - 6x - 2y = 0$

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3. Find the equation of the ellise in the standard form whose distance between foci is 2 and the length of latus rectum is $\frac{15}{2}$.

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4. If a tangent to the ellipse meets major and minor axis at M and N respectively and C is the centre of the ellipse thejn $\frac{a^2}{(CM)^2} + \frac{b^2}{(CN)^2} =$

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5. Find the centre, foci, eccentricity equation of the directrices, length of the latus rectum of the hyperbola.

$x^2 - 4y^2 = 4$

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6. Find the area bounded by $y = \sin x$ and $y = \cos x$ between any two consecutive points of intersection.

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7. Solve the following differential equations.

$$\left(1+x^2\right)\frac{dy}{dx}+y=e^{\tan^{-1}x}$$

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Section C

1. Find the equation of the circle passing through the points

$(3,4)(3,2),(1,4)$

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2. Find the direct common tangents of the circles

$x^2+y^2+22x-4y-100=0$ and $x^2+y^2-22x+4y+100=0$

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3. Prove that the area of the triangle formed by the tangents at $(x_1, y_1), (x_2)\text{and}(x_3, y_3)$ to the parabola $y^2 = 4ax(a > 0)$ is $\frac{1}{16a}|(y_1 - y_2)(y_2 - y_3)(y_3 - y_1)|$ sq.units.

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4. Evaluate the following integrals.

$$\int \frac{2\cos x + 3\sin x}{4\cos x + 5\sin x} dx$$

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5. Obtain reduction formula for $l_n = \int \tan^n x dx$, n being a positive integer $n \leq 2$ and deduce the value of $\int \tan^6 x dx$.

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6. Show that $\int_0^{\pi/2} \frac{x}{\sin x + \cos x} dx = \frac{\pi}{2\sqrt{2}} \log\left(\sqrt{2}+1\right)$.

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7. Solve the following differential equations.

$\left(x^2 y - 2xy^2\right) dx = \left(x^3 - 3x^2 y\right) dy$

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