MATHEMATICS PAPER IIB - MAY 2010

COORDINATE GEOMETRY & CALCULUS

TIME : 3hrs **Max. Marks.75**

SECTION A

VERY SHORT ANSWER TYPE QUESTIONS. **10X2 =20**

Noe : Attempt all questions. Each question carries 2 marks.

1. Find the centre and radius of the circle $\sqrt{1+m2}$ $(x^2 + y^2) – 2cx – 2mcy = 0$

2. Find the equation of the sphere that passes through the point (4, 3, -1) and having its centre (3,8,1)

3. If (1/2,2) is one extremity of a focal chord of the parabola $y^2=8x$ find the coodinates of the other extremity.

4. Find the eccentricity of the Ellipse (in Standard Form) whose length of the latusrectum is half of its minor axis.

5. Find thenth derivative of $y= \cos^2 x$.

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

7. Evaluate $\int \log x\, dx$

8. Evaluate $\int_0^1 \left(\frac{x^2}{1+x^2}\right) dx$

9. Find the area bounded by $y = x^3 +3$, X-axis, $x= -1$ and $x =2$.

10. Form the differential equation corresponding to $y = A\cos 3x + B\sin 3x$ where A<B are parameters.

SECTION B

SHORT ANSWER TYPE QUESTIONS. **5X4 =20**

Note : Answer any FIVE questions. Each question carries 4 marks.

11. Show that the tangent at (-1, 2) of the circle $x^2+y^2-4x-8y+7=0$touches the circle $x^2+y^2+4x+6y=0$ and also find its point of tangency.

12. Find the value of k if the lines $x+y+2=0$ *and* $x-2y+k=0$ are conjugate w.r.t $y^2+4x-2y-3=0$

13. Find eccentricity, coordinates of foci and equations of directrices of the ellispse $16y^2-9x^2=144$.

14. If PSQ is chord passing through the focus S of a conic and '*l*' is semi latus rectum, show that $\frac{1}{SP}+\frac{1}{SQ}=\frac{2}{l}$

15. Evaluate $\int\frac{1}{2-3\cos 2x}dx$

16. Solve $(e^x + 1)ydy + (y + 1)dx = 0$

17. Solve $\frac{dy}{dx}+y\sec x=\tan x$

SECTION C

LONG ANSWER TYPE QUESTIONS. **5X7 =35**

Note: Answer any Five of the following. Each question carries 7 marks.

18. Find the equation of a circle which passes through the points(5,7),(8,1) and (1,3).

19. Find the coordinates of the limiting points of the coaxial system to which the circles $x^2+y^2+10x-4y-1=0$ and $x^2+y^2+5x+y+4=0$ are two members

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

21. If $y=e^{m\sin^{-1}x}$, then prove that $\left(1-x^2\right)y_{n+2}-\left(2n+1\right)xy_{n+1}-\left(n^2+m^2\right)y_n=0$

22. Find the reduction formula for $\int\sin^n x\,dx\left(n\geq 2\right)$ and hence find $\int\sin^4 x\,dx$.

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

24. Show that the area of the region bounded by $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$(ellipse) is π ab. Also deduce the area of the circle $x^2+y^2=a^2$

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