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5421

Register Number:

Name of the Candidate:

B.Sc. DEGREE EXAMINATION, May 2015

(MATHEMATICS WITH COMPUTER APPLICATIONS)

**(FIRST YEAR)
(PART - III)**

530: ANALYSIS-I

Time: Three hours

Maximum: 100 marks

SECTION-A

(8× 5 = 40)

Answer any EIGHT questions

1. If $y = \sin(m \sin^{-1} x)$ prove that $(1-x^2)y_2 - xy_1 + m^2y = 0$
2. Evaluate $\lim_{x \rightarrow 0} \frac{\log x}{\cosec x}$
3. Show that the least value of $a^2 \sec^2 x + b^2 \cosec^2 x$ is $(a+b)^2$
4. Find the equation of the tangent to the curve $y = \frac{6x}{x^2 - 1}$ at the point $(2, 4)$
5. Find the radius of curvature of the curve $x^4 + y^4 = 2$ at the point $(1, 1)$
6. If $u = (x-y)(y-z)(z-x)$ show that $\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} + \frac{\partial u}{\partial z} = 0$
7. If $u = \sin^{-1}\left(\frac{x^2 + y^2}{x + y}\right)$ prove that $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = \tan u$
8. Evaluate $\int e^x \sin x dx$
9. Evaluate $\int_0^{12-x} \int_{x^2}^{xy} dy dx$
10. Solve $(D^2 + D + 1)y = x$

SECTION-B

(3× 20= 60)

Answer any THREE questions

11. a) If $y = e^{a \sin^{-1} x}$ prove that $(1-x^2)y_{n+2} - (2n+1)xy_{n+1} - (n^2+a^2)y_n = 0$.
b) If $f = \log(x-y) + \tan(x+y)$ show that $\frac{\partial^2 f}{\partial x^2} = \frac{\partial^2 f}{\partial y^2}$
12. a) Find the maximum and minimum values of $f(x, y) = x^4 + y^4 - 4xy + 1$
b) Find the radius of curvature of the curve $y = \cosh \frac{x}{c}$ at (x, y)

13. a) Evaluate $\int_0^{\frac{\pi}{2}} \log(\tan x) dx$

b) Find the volume when the loop of the curve $y^2=x(2x-1)^2$ revolves about the x-axis

14. a) Evaluate $\int_0^{\frac{\pi}{2}} \int_0^a dr d\theta$

b) Evaluate $\int_0^{\frac{\pi}{2}} \int_0^{a \sin \theta} \int_0^{\frac{a^2 - r^2}{2}} r dz dr d\theta$

15. a) Solve $(D^2 - D - 2)y = e^{2x} + \sin x$
 b) Solve $(D^2 - 3D + 2)y = 2e^{3x} \sin x$
