



BCA

M 6576

Reg. No. :

Name :

II Semester B.C.A. Degree (CCSS – Reg./Supple./Improv.)

Examination, May 2014

COMPLEMENTARY COURSE IN MATHEMATICS

2C02 MAT (BCA) : Numerical Analysis and Calculus

Time : 3 Hours

Max. Weightage : 30

1. Fill in the blanks :

a) Derivative of $x^{\log x}$ is _____b) $\frac{d}{dx}(a^x)$ is _____c) $\frac{d}{dx} \sinh^{-1} \sqrt{x}$ is _____d) $\lim_{x \rightarrow 1} \frac{\log x}{x-1}$ is _____

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2. Choose the correct answer from the following :

i) $\int_{-1}^1 x^3 dx$ (0, 1, -1, 2)

ii) $\int_0^1 \int_0^2 dx dy$ (0, 1, 2, -2)

iii) $\int_0^{\pi/2} \sin^2 x dx$ (0, $\pi/4$, $\pi/2$, $\pi/8$)

iv) $\int_0^1 \int_0^2 \int_0^3 dx dy dz$ (1, 2, 5, 6).

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P.T.O.



Answer **any five** from the following (weightage **1 each**) :

3. Solve $x^3 + x - 1 = 0$ by iteration and choosing $x_0 = 1$.
4. Find the approximate value of $\sqrt{2}$ by Newton's iteration method.
5. Solve $y' = y$, $y(0) = 1$, by Piccard's method.
6. Using Taylor series method solve $y' = x^2 - y$, $y(0) = 1$, at $x = 0.1$.
7. Differentiate $x\sqrt{1-x^2} + \sinh^{-1}(1+x)$.
8. Evaluate $\lim_{x \rightarrow 0} x^x$.
9. Integrate $\sin^6 x$.

10. Evaluate $\int_0^1 \int_0^1 (x+y) dx dy$.

(5×1=5)

Answer **any seven** from the following (weightage **2 each**) :

11. Using Lagrangian interpolation formula find $f(5)$, given $f(1) = -3$, $f(3) = 0$, $f(4) = 30$, $f(6) = 132$.
12. Evaluate $\int_0^1 \frac{dx}{1+x^2}$ using Simpson's rule.
13. If $y' = x + y$, $y(0) = 0$ find $y(1)$ by Euler's method.
14. If $y = x + y^2$, $y(0) = 1$ find $y(0.5)$ by improved Euler's method.
15. If $y = e^x + e^{-x}$, Show that $\frac{d^2y}{dx^2} = y$.
16. Find $\frac{dy}{dx}$ if $y = x^x + (\log x)^{\sin x}$.



17. Evaluate $\lim_{x \rightarrow 0} \left(\frac{1}{x^2} - \frac{1}{\sin^2 x} \right)$.

18. By successive reduction evaluate $\int_0^{\pi/4} \tan^6 x \, dx$.

19. Obtain a reduction formula to evaluate $\int \sec^n x \, dx$.

20. By changing the order of integration evaluate $\int_0^\infty \int_x^\infty \frac{e^{-y}}{y} \, dx \, dy$. (7×2=14)

Answer **any three** from the following (weightage **3 each**) :

21. Using Gauss elimination method,

Solve

$$3x_1 + 2x_2 + x_3 = 3$$

$$2x_1 + x_2 + x_3 = 0$$

$$6x_1 + 2x_2 + 4x_3 = 6.$$

22. Find the inverse of the matrix.

$$\begin{bmatrix} -1 & 1 & 2 \\ 3 & -1 & 1 \\ -1 & 3 & 4 \end{bmatrix} \text{ by Gauss Jordan method.}$$

23. If $y = e^{a \sin^{-1} x}$, Prove that

$$(1-x^2) y_{n+2} - (2n+1) x y_{n+1} - (a^2 + n^2) y_n = 0.$$

24. Find $y(0.8)$ with $h = 0.2$, using Runge-Kutta method, given $y' = x + y$, $y(0) = 0$.

25. Evaluate $\int_0^1 \int_0^{1-x} \int_0^{1-x-y} x \, dx \, dy \, dz$. (3×3=9)