(Please write your Exam Roll No.) *Exam Roll No. ....*

END TERM EXAMINATION

FIRST SEMESTER [BCA] NOVEMBER-DECEMBER-2018

Paper Code: BCA-101	***Subject: Mathematics-I***
Time: 3 Hours	***Maximum Marks: 75***

Note: Attempt any five questions including Q.no.1 which is compulsory.

Q1 (a) Evaluate the determinant of the matrix $\begin{vmatrix} \frac{1}{a} & a^2 & bc \\ \frac{1}{b} & b^2 & ca \\ \frac{1}{c} & c^2 & ab \end{vmatrix}$.

(b) Use Cramer's rule to sole the system of equations
$x + y + z + 1 = 0; ax + by + cz + d = 0;\ a^2x + b^2y + c^2z + d^2 = 0$

(c) Find the maximum value of $y = \left(\frac{1}{x}\right)^x$

(d) Evaluate $\int cosmx.cosnx\, dx, when\ (i) m \neq n\ (ii) m = n.$

(e) Evaluate $\lim_{x\to 0}\left(ex^{\frac{1}{x}} + 1\right)$, if it exists.

UNIT-I

Q2 (a) Show that the vectors
$x_1 = (1, 2, 4), x_2 = (2, -1, 3), x_3 = (0, 1, 2)\ and\ \ x_4 = (-3, 7, 2)$ are linearly dependent and find the relation between them.

(b) Find the eigen values and eigen vectors of $A = \begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$

Q3 (a) Given $A = \begin{bmatrix} 1 & 2 & -1 \\ 0 & 1 & -1 \\ 3 & -1 & 1 \end{bmatrix}$ find adj(A) by using Cayley-Hamilton theorem.

(b) Find the rank of the matrix $A = \begin{bmatrix} 2 & 3 & -1 & -1 \\ 1 & -1 & -2 & -4 \\ 3 & 1 & 3 & -2 \\ 6 & 3 & 0 & -7 \end{bmatrix}$

UNIT-II

Q4 (a) Discuss the continuity of the function
$f(x) = \frac{xe^{1/x}}{1+e^{1/x}}, when\ x \neq 0, f(0) = 0$

(b) Solve $\lim_{x\to 0}\left(\frac{(1+x)^{\frac{1}{x}} - e + \frac{e^x}{2}}{x^2}\right)$

Q5 (a) Discuss the continuity of the function
$f(x) = \begin{cases} \frac{sinx}{x} & if\ x < 0 \\ (x+1), & if\ x \geq 0 \end{cases}$

(b) Evaluate (*i*) $\lim_{x\to 0}\frac{(1+x^n-1)}{x}$ $\lim_{x\to 0}\frac{\log(\tan^2 2x)}{\log(\tan^2 x)}$

UNIT-III

Q6 (a) Verify Lagrange's Mean value Theorem for
$f(x) = 2x^2 - 7x + 10, 2 \le x \le 5$

(b) Expand *logx* in powers of (x-1) by Taylor's theorem and hence find the value of $\log_e (1.1)$.

Q7 (a) $if\ y = e^{m\cos^{-1}x}, show\ that\ (1-x^2)\,y_{n+2} - (2n+1)\,xy_{n+1} - (n^2+m^2)\,y_n = 0$ and calculate $y_n(0)$.

(b) find all the asymptotes of the curve
$$y^3 + 4xy^2 + 4x^2y + 5y^2 + 15xy + 10x^2 - 2x + 1 = 0$$

UNIT-IV

Q8 (a) Prove that $(m,n) =$

(b) (*i*)*Evaluate* $\int_0^{2a} x^{3/2}(2a-x)^{1/2}dx$ (ii) *Evaluate* $\int_0^{2} x(8-x^3)^{1/3}dx$.

Q9 (a) If $I_n = \int_0^{\pi/4} \tan^n x dx$, show that $I_n + I_{n-2} = \frac{1}{n-1}$.

(b) Evaluate $\int \tan^{-1}\left(\frac{2x}{1-x^2}\right)dx$.

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