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Total No. of Pages : 03

Total No. of Questions : 07

BCA (2011 & Onwards) (Sem.-2)

MATHEMATICS-II

Subject Code : BSBC-202

Paper ID : [B1114]

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains SIX questions carrying TEN marks each and students has to attempt any FOUR questions.
3. Log tables may be asked if needed.

SECTION-A

I. Write short notes on :

(a) If A and B are square matrices of order 3 such that $|A| = -1$, $|B| = 2$, then what will be the value of $|4AB|$.

(b) Construct a 2×3 matrix whose elements a_{ij} are given by $a_{ij} = \frac{(i-2j)^2}{2}$.

(c) Find the rank of matrix $A = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}$

(d) Calculate the mean deviation about mean from the data given below :

X	3	9	17	23	27
f	8	10	12	9	5

(e) Find the point of maxima of the function :

$$f(x) = 2x^3 - 15x^2 + 36x + 4$$

(f) Evaluate the integral $\int \log x \, dx$.

(g) Obtain the value of the integral $\int_2^3 \frac{dx}{x^2 + x}$.

(h) State Simpson's 1/3 and 3/8 rule to evaluate $\int_a^b f(x) dx$

(i) Differentiate $\sqrt{\sin \sqrt{1+x^2}}$ w.r.t. x .

(j) Find the value of $\log_3 \sqrt{27}$.

SECTION-B

2. (a) Find the inverse of matrix $A = \begin{bmatrix} 1 & 3 & 2 \\ -1 & 0 & -2 \\ 3 & -2 & 1 \end{bmatrix}$.

(b) Using Cramer's rule solve the equations : $2x - y + 3z = 8$,
 $x - 2y - z = -4$, $3x + y - 4z = 0$.

3. (a) Using the properties of determinants, prove that $\begin{vmatrix} x-y-z & 2y & 2z \\ 2x & y-z-x & 2z \\ 2x & 2y & z-x-y \end{vmatrix}$
 $= (x + y + z)^3$.

(b) Without using log tables, prove that

$$7 \log \frac{16}{15} + 5 \log \left(\frac{25}{24} \right) + 3 \log \left(\frac{81}{80} \right) = \log 2$$

4. (a) If Rs. 2400 are invested in a bank at 10% p.a. rate of interest compounded annually for 3 years. Find compound interest and amount.

(b) Differentiate w.r.t. x the function

$$f(x) = \sqrt{\frac{1 + \cos x}{1 - \cos x}}$$

5. (a) Find two positive numbers whose sum is 16 and the sum of whose squares is minimum.

(b) Evaluate the following integrals :

(i) $\int_0^{\pi/2} \frac{\cos x}{3 + 4 \sin x} dx$

(ii) $\int \frac{1}{1 + e^x} dx$

6. (a) Evaluate $\int_0^6 \frac{1}{1+x^2} dx$ by using Simpson's $\left(\frac{1}{3}\right)^{\text{rd}}$ rule.

(b) Differentiate the following functions *w.r.t.* x

(i) $\tan^{-1} \left(\frac{2x}{1-x^2} \right)$

(ii) $\frac{e^x + \sin 2x}{1 + \cos 2x}$

7. (a) Calculate the mode of the following distribution :

Class	0-7	7-14	14-21	21-28	28-35	35-42	42-49
Frequency	19	25	36	72	51	43	28

(b) Calculate the mean and standard deviation of the following data :

Size of item	6	7	8	9	10	11	12
Frequency	3	6	9	13	8	5	4