Roll No. | | | | | | | | | | | | | **Total No. of Pages : 04**

Total No. of Questions : 14

B. Sc. (IT) (Sem.–4)

COMPUTER ORIENTED NUMERICAL METHODS

Subject Code : BSIT-404

M.Code : A0211

Time : 3 Hrs. **Max. Marks : 75**

INSTRUCTIONS TO CANDIDATES :

1. **Section-A is compulsory consisting of twenty questions of ONE mark each.**
2. **Section-B consists of EIGHT questions of FIVE marks each. Candidate has to attempt any FIVE questions.**
3. **Section-C consists of FIVE questions of TEN marks each. Candidate has to attempt any THREE questions.**

SECTION-A

l. a) If $A=\begin{pmatrix} 1 & -1 \\ -1 & 1 \end{pmatrix}$ satisfies the equation $A^2 = kA$ then the value of $k =$

(a) 2 (b) –2 (c) 1 (d) –1

b) For any square matrix A, A.(adj A) = ……..

c) If A and B are invertible matrices of same order then $(AB)^{-1} = B^{-1}A^{-1}$. (*True*/False)

d) Matrix multiplication is not commutative in general. (True/False)

e) If the order of a matrix A is 2 × 5 and that of matrix B is 5 × 3, then order of AB is ……

f) If $x\begin{pmatrix} 1 \\ 0 \end{pmatrix} + y\begin{pmatrix} 0 \\ 2 \end{pmatrix} = \begin{pmatrix} 3 \\ 4 \end{pmatrix}$, then $x + y =$

(a) 7 (b) 5 (c) 6 (d) 2

g) If A and B are square matrices of same order then $(AB)^{/} =$

(a) $(BA)^{/}$ (b) $B^{/}A^{/}$ (c) $A^{/}B^{/}$ (d) None of these

h) If A, G, H are respectively the Arithmetic mean, Geometric mean and Harmonic mean, then G^2 = …….

i) The Harmonic mean between the two numbers *a* and *b* is

(a) $\frac{2ab}{a+b}$ (b) $\frac{ab}{a+b}$ (c) $\frac{a+b}{2ab}$ (d) None of these

j) Median is not affected by extreme values. (True/False)

k) If $f(x) = x + 1$, then $\frac{d}{dx}(fof)(x) = ...$

l) If $xy = 1$, then $\frac{dy}{dx} + y^2 = 0$. (True/False)

m) If $x + y = 8$, then the maximum value of xy is

(a) 8 (b) 16 (c) 20 (d) 24

n) The minimum value of $x + \frac{1}{x}, x > 0$ is

(a) 0 (b) 6 (c) 2 (d) 8

o) $\int \frac{1}{1+x^2} dx = \tan^{-1} x + C$ (True/False)

p) $\int 2^x dx$ = …….

q) $\int_a^b f(x)dx = \int_a^b f(t)dt$ (True/False)

r) $\int e^x (f(x) + f'(x))\, dx$ = ……

s) $\int_{-\pi/2}^{\pi/2} \sin^7 x dx =$

(a) 2 (b) 0 (c) 1 (d) 6

t) $\int_1^e \log x\, dx =$

(a) 1 (b) $e + 1$ (c) $e - 1$ (d) 0

SECTION-B

2. Find the inverse of the matrix $\begin{pmatrix} -1 & 1 & 2 \\ 3 & -1 & 1 \\ -1 & 3 & 4 \end{pmatrix}$.

3. Average scores of three Batsmen A, B and C are respectively 40, 45 and 55 and their standard deviations are 9, 11 and 15. Which batsman is more consistent and why ?

4. If $y=\sqrt{\frac{1-x}{1+x}}$, prove that $(1-x^2)\frac{dy}{dx}+y=0$.

5. Evaluate $\int_0^2 \frac{1}{1+x^4}dx$, taking n = 4 by Simpson's 1/3rd rule. Give the answer to three places of decimal.

6. Evaluate $\int \sin\sqrt{x}dx$.

7. Solve the following system of linear equations by Gauss Elimination method :

   $x + y + z = 6,\ x - y + 2z = 5,\ 3x + y + z = 8$

8. Evaluate : $\int \frac{2x+1}{(x+1)(x-2)}dx$.

9. Find the rank of the matrix $\begin{pmatrix} 2 & 2 & 2 \\ 1 & 2 & 1 \\ 3 & 4 & 3 \end{pmatrix}$

SECTION-C

10. Solve the following system of linear equations by matrix inversion method :

    $x - y + 2z = 7,\ 3x + 4y - 5z = -5,\ 2x - y + 3z = 12$

11. A wire of length 28 m is to be cut into pieces. One of the pieces is to be made into a square and the other into a circle. What should be the length of the two pieces so that the combined area of the circle and square is minimum ?

12. Evaluate $\int_0^{\pi/4} \log(1+\tan x)\,dx$.

13. a) Find the coefficient of skewness from the following data :

Marks above :	0	10	20	30	40	50	60	70	80
No. of Students :	150	140	100	80	80	70	30	14	0

b) Find the derivative of $e^{ax} \cos(bx + c)$.

14. a) If $A = \begin{pmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{pmatrix}$, then prove that $A^2 - 4A - 5I = O$.

b) Given that

***x* :**	4.0	4.2	4.4	4.6	4.8	5.0	5.2
Log *x* :	1.3863	1.4351	1.4816	1.5261	1.5686	1.6094	1.6487

Evaluate $\int_4^{5.2} \log x\,dx$ by Simpson's 3/8 rule.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.