



DELHI SKILL AND ENTREPRENEURSHIP UNIVERSITY

Full Time Diploma Programs

End Semester Examination; Semester II, AY:2021-22

Course: Applied Mathematics - II

Course Code: CE-FC201/CS-FC201/EC-FC201/ME-FC201/  
EE-FC201/TD-FC201/CHE-FC201/AE-FC201

Time: 2 Hours

Max. Marks: 50

SECTION - I

Attempt **any fifteen** out of the following questions:

(15\*2 = 30)

Q1. Calculate the modulus of the sum of the vectors  $i + 4j + 2k$ ,  $3i - 3j - 2k$  and  $-2i + 2j + 6k$

- a) 4                      b) 3                      c) 7                      d) 0

Q2. For what value of  $\lambda$  the vectors  $\vec{a} = 2i + \lambda j + k$  and  $\vec{b} = i - 2j + 3k$  are perpendicular to each other

- a)  $\frac{7}{2}$                       b)  $\frac{3}{2}$                       c)  $\frac{5}{2}$                       d)  $\frac{9}{2}$

Q3. If  $\vec{a} = i + j + 3k$  and  $\vec{b} = 4i - 2j + 7k$ , find  $|\vec{a} \times \vec{b}|$

- a)  $\sqrt{230}$                       b)  $\sqrt{250}$                       c)  $\sqrt{350}$                       d)  $\sqrt{450}$

Q4. If  $\begin{vmatrix} 2x & 5 \\ 8 & x \end{vmatrix} = \begin{vmatrix} 6 & -2 \\ 7 & 3 \end{vmatrix}$  then  $x$  is

- a) 6                      b)  $\mp 6$                       c) 3                      d)  $\mp 3$

Q5. Solve the matrix equation  $\begin{bmatrix} x & 1 \end{bmatrix} \begin{bmatrix} 1 & 0 \\ -2 & -3 \end{bmatrix} \begin{bmatrix} x \\ 5 \end{bmatrix} = 0$

- a) -3, 5                      b) 3, 5                      c) -3, -5                      d) 4, 5

Q6. Evaluate the determinant  $\begin{vmatrix} \sin 10^\circ & -\cos 10^\circ \\ \sin 80^\circ & \cos 80^\circ \end{vmatrix}$

- a) 2                       b) 1                      c) -1                      d) -2

Q7. Construct a  $2 \times 2$  matrix  $A = [a_{ij}]$  whose element are given by  $a_{ij} = i + 2j$

✓ a)  $\begin{bmatrix} 3 & 5 \\ 4 & 6 \end{bmatrix}$

b)  $\begin{bmatrix} 3 & 4 \\ 5 & 6 \end{bmatrix}$

c)  $\begin{bmatrix} 4 & 3 \\ 6 & 5 \end{bmatrix}$

d) None

Q8. Find the area of parallelogram having diagonals  $3i + j - 2k$  and  $i - 3j - 4k$

a)  $2\sqrt{3}$

✓ b)  $5\sqrt{3}$

c)  $3\sqrt{2}$

d)  $3\sqrt{5}$

Q9. If  $A$  is a symmetric matrix then find value of  $\lambda$  where  $A = \begin{bmatrix} 2 & -5 & 6 \\ -5 & 3 & \lambda \\ 6 & 4 & 1 \end{bmatrix}$

a) -5

b) 6

✓ c) 4

d) 3

Q10. If  $A^{-1} = \begin{bmatrix} 5 & 3 \\ 2 & -1 \end{bmatrix}$  then  $(A^T)^{-1}$  is

✓ a)  $\begin{bmatrix} 5 & 2 \\ 3 & -1 \end{bmatrix}$

b)  $\begin{bmatrix} 5 & -3 \\ -2 & 1 \end{bmatrix}$

c)  $\begin{bmatrix} -5 & 3 \\ 2 & -1 \end{bmatrix}$

d)  $\begin{bmatrix} -5 & -3 \\ 2 & 1 \end{bmatrix}$

Q11. If  $|A| = 0$  then  $A$  is

a) zero matrix

b) unit matrix

✓ c) singular matrix

d) non singular matrix

Q12. The solution of the differential equation  $\frac{dy}{dx} = (1 + y^2)$  is <https://www.dseudelhi.com>

✓ a)  $y = \tan x + c$     b)  $\tan^{-1}(y + c) = x$     c)  $\tan^{-1}(y + c) = 2x$     ✓ d)  $y = \tan(x + c)$

Q13. The general solution of the differential equation  $\frac{dy}{dx} = e^{x+y}$  is

✓ a)  $e^x + e^{-y} = c$

b)  $e^x + e^y = c$

c)  $e^{-x} + e^y = c$

d)  $e^{-x} + e^{-y} = c$

Q14. The Integrating factor of the differential equation  $\frac{dy}{dx} - y = \cos x$  is

a)  $e^x$

✓ b)  $e^{-x}$

c)  $e^{-2x}$

d)  $e^{2x}$

Q15. If  $A = \begin{bmatrix} 0 & 1 & -2 \\ -1 & 0 & 3 \\ x & -3 & 0 \end{bmatrix}$  is a Skew Symmetric matrix then  $x$  is

a) 0

b) 1

c) -2

✓ d) 2

Q16. Evaluate the value of  $\int_0^{2/3} \frac{dx}{4+9x^2}$

a)  $\frac{\pi}{6}$

b)  $\frac{\pi}{12}$

✓ c)  $\frac{\pi}{24}$

d)  $\frac{\pi}{4}$

Q17. Evaluate the value of  $\int e^x(-\operatorname{cosec}^2 x + \cot x)dx$  is equals to

- a)  $-e^x \cot x + c$       b)  $e^x \operatorname{cosec}^2 x + c$       c)  $e^x \cot x \operatorname{cosec} x + c$       d)  $e^x \sec^2 x + c$

Q18. Evaluate  $\int_{-4}^{-1} \frac{1}{x} dx$  is

- a)  $\log 4$       b)  $-\log 4$       c)  $\log \left| \frac{3}{4} \right|$       d)  $\log 5$

### SECTION - II

Attempt any five out of the following questions:

(5\*4=20)

Q19. Evaluate  $\Delta = \begin{vmatrix} 1 & -3 & 2 \\ 4 & -1 & 2 \\ 3 & 5 & 2 \end{vmatrix}$  by using Sarrus diagram.

Q20. Apply Crammers rule to solve the linear equations

$$x + y + z = 3$$

$$2x - y + z = 2$$

$$x - 2y + 3z = 2$$

Q21. If  $\vec{a} = i + 2j - 3k$  and  $\vec{b} = 3i - j + 2k$  show that  $\vec{a} + \vec{b}$  and  $\vec{a} - \vec{b}$  are perpendicular to each other.

Q22. Find the angle between the vectors  $\vec{a} = 5i + 3j + 4k$  and  $\vec{b} = 6i - 8j - k$ .

Q23. Solve the following differential equation  $(x^2 - y^2) dx + 2xydy = 0$ .

Q24. Solve the differential equation  $\frac{dy}{dx} + y \sec x = \tan x$

Q25. Evaluate  $\int_0^{\pi} \log(1 + \tan x) dx$

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