Group – II $S_{2(UMA12B10, DTMA12B12)}$ **All**

B.Tech 2nd Semester End-Term Examination 2021
Subject Name: Engineering Mathematics – II
Subject Code: UMA12B10, DTMA12B12
Answer Script to be submitted through email: nita.ma.btech.j1@gmail.com

Full Marks: 50 **Time: 2 Hours**

Symbols Used Here Have Their Usual Meanings

Choose the correct option from the following: **[10 × 2 = 20 Marks]**

1. The value of $\int_{-1}^{1}\int_{0}^{z}\int_{x-z}^{x+z}(x+y+z)dx\,dy\,dz$

a) 0 **b)** $\frac{1}{2}$
c) $\frac{3}{2}$ **d)** None of these

2. If $A=\begin{bmatrix}-4 & -3 & -2\\ -1 & 0 & 1\\ 2 & 3 & 4\end{bmatrix}$, then $adj\ A$ is

a) Hermitian matrix **b)** Skew-symmetric matrix
c) Symmetric matrix **d)** None of these

3. If $\boldsymbol{log\frac{a+ib}{a-ib}=2itan^{-1}\frac{b}{a}}$ then $\boldsymbol{cos(ilog\frac{a+ib}{a-ib})}$ is equal to

a) $\frac{a^2-b^2}{a^2+b^2}$ **b)** $\frac{a^2+b^2}{a^2-b^2}$
c) $\frac{a^2}{a^2-b^2}$ **d)** none of these

4. The value of the integral $\int_C \frac{z^2-z+1}{z-1}dz$ where $C:|z|=0.5$ is

a) 0 **b)** 1
c) 2 **d)** 3

5. The sum of the residues of $\frac{tan\,z}{z}$ at its pole inside the circle $|z|=2$ is

a) 0 **b)** 1
c) 2 **d)** none of these

6. The directional derivative of $\boldsymbol{f(x,y,z)=xy^2+yz^3}$ at the point $(2,-1,1)$ in the direction of vector $\boldsymbol{\hat{i}+2\hat{j}+2\hat{k}}$ is

a) $-3\frac{2}{3}$ **b)** -3
c) $\frac{2}{3}$ **d)** None of these

7. The function $f(z)=\frac{x^3(1+i)-y^3(1-i)}{x^2+y^2}, z\neq 0$ and $f(0)=0$

a) Satisfies C-R equations at $z=0$ **b)** is analytic at $z=0$
c) is differentiable but not analytic at $z=0$ **d)** None of these.

8. If the vector $\bar{F}=(xyz)^b(x^a\hat{i}+y^a\hat{j}+z^a\hat{k})$ is an irrotationalvector, then the values of a and b are respectively

a) 0 and -1 **b)** -1 and 0
c) 2 and 3 **d)** None of these

9. $Curl(gradr^n)$ is

a) 1 **b)** 0
c) i **d)** j

10. The value of the integral $\int_0^\infty \boldsymbol{3^{-4x^2}dx}$ is

a) $\frac{\sqrt{\pi}}{2}$ **b)** $\frac{\sqrt{\pi}}{4\sqrt{log3}}$
c) $\frac{1}{23}$ **d)** None of these

Choose the correct option from the following: **[10 × 3 = 30 Marks]**

11. The value of the integral $\int_0^4\int_0^{2\sqrt{z}}\int_0^{\sqrt{4z-x^2}}\boldsymbol{dydxdz}$ is

a) 2π 5π
c) 8π None of these

12. The value of the integral $\iiint \boldsymbol{xyz(x^2+y^2+z^2)dxdydz}$ over the positive octant of the sphere $\boldsymbol{x^2+y^2+z^2=a^2}$ is equal to

a) $\frac{a^8}{64}$ **b)** $\frac{a^5}{64}$
c) $\frac{a^9}{100}$ **d)** None of these

13. The Eigen vectors corresponding to one of the Eigen values of the matrix $\boldsymbol{A=\begin{bmatrix}2 & -2 & 0\\ -2 & 1 & -2\\ 0 & -2 & 0\end{bmatrix}}$ is

a) $\boldsymbol{k\begin{pmatrix}-2\\-1\\2\end{pmatrix}}$ **b)** $\boldsymbol{k\begin{pmatrix}-2\\-3\\2\end{pmatrix}}$
c) $\boldsymbol{k\begin{pmatrix}-3\\-1\\2\end{pmatrix}}$ **d)** $\boldsymbol{k\begin{pmatrix}-2\\-1\\-2\end{pmatrix}}$

14. If $A=\frac{1}{9}\begin{bmatrix}-8 & 4 & a\\ 1 & 4 & b\\ 4 & 7 & c\end{bmatrix}$ is orthogonal, then the values of a, b, c are respectively

a) $-1,-8,4$ **b)** $1,-8,4$
c) $1,-8,-4$ **d)** $1,8,4$

15. If $\bar{F}=xz^2\hat{i}-2y^2z^2\hat{j}+xy^3z\hat{k}$, then the value of $div\ \bar{F}$ at the point$(1,1,-1)$ is:

a) 5 **b)** 6
c) 7 **d)** None of these

16. Which among the following is the value of $\int_1^3\int_{1/x}^1\int_0^{\sqrt{xy}} xyz\,dx\,dy\,dz$?

a) $\frac{1}{8}(25+log27)$ **b)** $\frac{1}{6}(26+log27)$
c) $\frac{1}{8}(26+log26)$ **d)** $\frac{1}{8}(26+log27)$

17. If $A=\begin{bmatrix}1 & 4\\ 1 & 1\end{bmatrix}$, then the value of A^7-9A^2+I is

a) $609A+640I$ **b)** $619A+640I$
c) $609A+650I$ **d)** $609A+649I$

18. If $w=u+iv$ is an analytic function and $u=\frac{sin2x}{cosh2y+cos2x}$, then the value of w will be

a) $tanz+c$ **b)** iz^3+c
c) $-iz^3+c$ **d)** $tan^{-1}\left(\frac{y}{x}\right)+c$

19. The value of the integration $\oint\frac{3z^2+2z-4}{z^3-4z}dz$, where C is $|z-i|=3$ is

a) $4\pi i$ **b)** $-\frac{16\pi i}{9}$
c) $-4\pi i$ **d)** $6\pi i$

20. The work done in moving a particle in the force field $\boldsymbol{\bar{F}=3x^2\hat{i}+(2xz-y)\hat{j}+z\hat{k}}$, along the straight line from (0,0,0) to (2,1,3) is

a) 1 **b)** 16
c) 8 **d)** None of these

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