B.Tech 2nd Semester Mid-Term Examination 2021
Subject Name: Engineering Mathematics – II
Subject Code: UAD12B13, DTPH12B12

Full Marks: 20   Answer Script To Be Submitted Through Email: nita.ma.btech.b1@gmail.com   Time: 1 Hour
Symbols Used Here Have Their Usual Meanings

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

1. The value of the integral $I = \int_0^\infty e^{-\frac{x^2}{4}}\, dx$ is
   a) $\sqrt{\pi}$
   b) $-\sqrt{\pi}$
   c) π
   d) None of these

2. The improper integral $\int_0^1 \frac{dx}{x^n}$ is convergent only if
   a) $n = 1$
   b) $n < 1$
   c) $n \le 1$
   d) None of these

3. The value of $B\,(n,n)$ is
   a) $\frac{\sqrt{\pi}}{2^{2n-1}} \times \frac{\Gamma(n)}{\Gamma\left(n-\frac{1}{2}\right)}$
   b) $\frac{\sqrt{\pi}}{2^{2n+1}} \times \frac{\Gamma(n)}{\Gamma\left(n+\frac{1}{2}\right)}$
   c) $\frac{\sqrt{\pi}}{2^{2n-1}} \times \frac{\Gamma(n)}{\Gamma\left(n+\frac{1}{2}\right)}$
   d) None of these

4. The value of $\int_0^1 \int_{x^2}^{2-x} xy\,dx\,dy$ by changing the order of integration, is
   a) $\frac{1}{3}$
   b) $\frac{3}{8}$
   c) $\frac{1}{2}$
   d) $\frac{1}{4}$

5. Using the transformation $x + y = u, y = uv$, the value of the integral $\int_0^1 \int_0^{1-x} e^{\frac{y}{x+y}}dy\,dx$ is
   a) $\frac{1}{2}(e-1)$
   b) $(e-1)$
   c) $(e+1)$
   d) None of these

6. In the normal form of the matrix $A = \begin{bmatrix} 1 & 3 & 4 & 2 \\ 2 & -1 & 3 & 2 \\ 3 & -5 & 2 & 2 \\ 6 & -3 & 8 & 6 \end{bmatrix}$, the order of the identity matrix is
   a) 4
   b) 1
   c) 2
   d) None of these

7. The values of k, for which the system of linear equations, $kx + y + z = 1; x + ky + z = 1; x + y + kz = 1$ will have unique solution are
   a) $k \ne 1, k \ne -2$
   b) $k = 1, k \ne -2$
   c) $k \ne 1, k = -2$
   d) None of these

8. The system of non-homogeneous linear equations: $2y + 4z + 5 = 0; 8x - y + 4z = 12; 16x - y + 10z = 1$ are
   a) Consistent and unique solution exist
   b) Inconsistent
   c) Consistent and infinite number of solution exist
   d) None of these

9. The homogeneous system of linear equations $AX = O$ containing n equations with n unknowns has a non-zero solution if and only if
   a) $rank\ A < n$
   b) $rank\ A = n$
   c) $rank\ A > n$
   d) none of these

10. The rank of the matrix $A = \begin{bmatrix} 1 & 3 & 5 & -1 \\ 2 & 1 & -2 & 8 \\ 0 & 5 & 12 & -10 \end{bmatrix}$ will be
    a) 1
    b) 2
    c) 3
    d) 4

* *