R16

Code No: 131AB

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech I Year I Semester Examinations, May/June - 2019

MATHEMATICS-II

(Common to CE, ME, MCT, MMT, AE, MIE, PTM, CEE, MSNT)

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

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART- A

(25 Marks)

1.a) Find L[Sint Cost]. [2]

b) State convolution theorem. [3]

c) Evaluate $\int_0^1 x^3\sqrt{1-x}\,dx$. [2]

d) Evaluate $\int_0^{\pi/2} \sqrt{\sec\theta}\,d\theta$. [3]

e) Find the limits after changing the order for $\int_0^1\int_{x^2}^{2-x} x^2\,dxdy$. [2]

f) Evaluate $\int_0^\infty \int_0^\infty e^{-(x^2+y^2)}\,dxdy$. [3]

g) If $\bar{r} = x\bar{i} + y\bar{j} + z\bar{k}$ then find $div\,\bar{r}$. [2]

h) State Gauss's Divergence theorem. [3]

i) If S is any closed surface enclosing a volume V and $\bar{F} = x\bar{i} + 2y\bar{j} + 3z\bar{k}$ then find $\iint_s \bar{F}.\bar{n}ds$. [2]

j) If $\phi = x^2 + y^2 + z^2 - 3xyz$ then find $curl\left(grad\phi\right)$. [3]

PART-B

(50 Marks)

2. Find the Laplace transform of the saw toothed wave of period T, given $f\left(t\right)=\frac{k}{T}t$, when $0<t<T$. [10]

OR

3. Using Laplace transform, solve $(D^2+4D+5)y=5$, given that $y(0)=0$, $y'\left(0\right)=0$. [10]

4. Prove that $\frac{\beta(p,q+1)}{q}=\frac{\beta(p+1,q)}{p}=\frac{\beta(p,q)}{p+q}$ where $p>0, q>0.$ [10]

OR

5. Prove that $\Gamma\left(\frac{1}{2}\right)\Gamma(2n)=2^{2n-1}\Gamma(n)\Gamma\left(n+\frac{1}{2}\right).$ [10]

6.a) Evaluate $\int_0^1\int_0^{x^2} e^{y/x}\,dy\,dx.$

b) Evaluate the integral by changing the order of integration $\int_0^3\int_1^{\sqrt{4-y}}(x+y)\,dx\,dy.$ [5+5]

OR

7. Find by triple integration, the volume of the solid bounded by the co-ordinate planes x=0, y=0, z=0 and the plane x+y+z=1. [10]

8. Find the values of a and b so that the surfaces $ax^2 - byz = (a+2)x$ and $4x^2y+z^3 = 4$ may intersect orthogonally at the point (1, -1, 2). [10]

OR

9. Find the angle of intersection of the spheres $x^2+y^2+z^2=29$ and $x^2+y^2+z^2+4x-6y-8z-47=0$ at the point (4, -3, 2). [10]

10. Verify Stoke's theorem for $\bar{F}=\left(x^2+y^2\right)\bar{i}-2xy\bar{j}$ taken round the rectangle bounded by the lines $x=\pm a, y=0, y=b.$ [10]

OR

11. Verify Green's theorem for $\int_C\left[\left(3x^2-8y^2\right)dx+\left(4y-6xy\right)dy\right]$ where 'C' is the region bounded by $x=0, y=0, x+y=1.$ [10]

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