R18 Regulation *Subject code:* **2B2AA**

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A' Grade)

B.Tech II Semester Regular/Supplementary Examinations, November2020

Engineering Mathematics-II

(Common to CE,EEE,ME,ECE,CSE & IT)

Maximum Marks: 70 Date:11.11.2020 Duration: 2 hours

Part-A

All the following questions carry equal marks **(10x1M=10 Marks)**

1 Define orthogonal trajectory to a given family of curves.

2 Define Bernoulli Differential equation.

3 Solve $\frac{d^4y}{dx^4} - 4y = 0$

4 Find the particular integral of $(4D^2 - 4D + 1)\, y = 100$

5 Find L(sin (at))

6 Find $L^{-1}\left\{\frac{1}{2s-5})\right\}$

7 Define curl of a vector point function.

8 Define solenoidal vector.

9 Prove that $\int_S (axi + byj + czk).\bar{n}\, ds = \frac{4\pi}{3}(a + b + c)$ where s is the surface of the sphere $x^2 + y^2 + z^2 = 1$

10 Write the Statement of Green's theorem in a plane.

Part-B

Answer any 5 questions **(5X 12M=60Marks)**

11 a) Solve $e^x\frac{dy}{dx}=2xy^2+ye^x$ (6M)

b) The number N of bacteria in a culture grew at a rate proportional to N. The value of N was initially 100 increased to 332 in one hour. What was the value of N after $1\frac{1}{2}$. (6M)

12 Solve $\frac{dy}{dx} + x\sin 2y = x^3 cos^2 y$ (12M)

13 Solve $D^2(D^2 + 4)y = 96x^2 + sin2x - k$ (12M)

14 Solve $[(x + 2)^2 D^2 - (x + 2)D + 1]y = 3x + 4.$ (12M)

15 Make use of convolution theorem to evaluate (12M)

$L^{-1}\{\frac{1}{(s^2+a^2)^2}\}$

16 Solve the Differential Equation $\frac{d^2x}{dt^2}$ -4$\frac{dx}{dt}$ -12x = e^{3t} given that x(0)=1 and x(0) = -2 using Laplace Transform. (12M)

17 Prove that the vector $(x^2 - yz)i + (y^2 - zx)j + (z^2 - xy)k$ is irrotational and find its scalar potential. (12M)

18 Prove that (6M+6M)

(a)If $\bar{r}$ is the position vector of any point in space, then prove that $r^n.\bar{r}$is irrotational.

(b)Prove that ∇x (∇ x $\bar{a}$) = ∇ (∇. $\bar{a}$) - $\nabla^2\bar{a}$

19 Evaluate $\int_v (\nabla \times \bar{F})dv$

where 'v' is the closed region bounded by x=0, y=0, z=0, 2x+2y+z=4 if

$\overline{F} = (2x^2 - 3z)i - 2xyj - 4xk$ (12M)

20 Verify Gauss Divergent theorem for $\bar{F}$ = $(x^3 - yz)\bar{\imath} - 2x^2y\bar{\jmath} + z\bar{k}$ taken over the surface of the cube bounded by the planes x=y=z=a and co-ordinate planes. (12M)