R17 Regulation *Subject Code: 1B2AG*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech. I Year II Semester Supplementary Examinations, January 2024

MATHEMATICS-II

(Common to EEE,ECE,CSE & IT)

Maximum Marks: 70 Date: 23.01.2024 Duration: 3hours

Note: **1.This question paper contains two parts A and B.**
2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit.
4. Each question carries 10 marks and may have a,b,c,d as sub questions.

Part-A

All the following questions carry equal marks **10x2M=20 Marks**

1. Define Beta and Gamma function.
2. Find the value of $\beta(2,3)$
3. Compute the value of $\int_0^{\pi/2}\int_0^{sin\theta} r dr d\theta$
4. Evaluate $\int_0^1\int_1^2 (x+y)dydx$
5. Find div F where F = grad $(x^3 + y^3 + z^3 - 3xyz)$.
6. What is the value of $div\,\vec{r}$?
7. If $\nabla\emptyset = x\vec{i} + y\vec{j} + z\vec{k}$, find the scalar potential
8. State Stoke's theorem
9. Define first shifting theorem for Laplace transform.
10. State convolution Theorem.

Part-B

Answer all the questions **5X10M=50M**

11. a) P.T $\Gamma(m)\,\Gamma(m+{}^1/_2) = \frac{\sqrt{\pi}}{2^{2m-1}}\,\Gamma(2m)$ (5M)

b) $\beta(m,n) = \frac{1}{2}\int_0^{\frac{\pi}{2}} \sin^{2m-1}\theta \cos^{2n-1}\theta\, d\theta$ (5M)

(OR)

12. Evaluate $\int_0^\infty e^{-ax}x^{m-1}sinbx\ dx$ in terms of Gamma function. (10M)

13. Evaluate the integral by changing the order of integration $\int_0^1\int_{x^2}^{2-x} xy\,dxdy$ (10M)

(OR)

14. Change the order of integration and evaluate $\int_0^1\int_0^x dydx$ (10M)

15. Show that $\nabla\times(\nabla\times\vec{F}) = \nabla(\nabla\cdot\vec{F}) - \nabla^2\vec{F}$ (10M)

(OR)

16. (a) Find the value of the constants a, b, c so that the vector (5M)

$\vec{F} = (x+2y+az)\vec{\imath} + (bx-3y-z)\vec{\jmath} + (4x+cy+2z)\vec{k}$ is irrotational.

(b) Find the value of 'a' so that the vector $\vec{F} = (x+3y)\vec{\imath} + (y-2z)\vec{\jmath} + (x+az)\vec{k}$ is Solenoidal. (5M)

17. Evaluate $\int_C (xy+x^2)dx + (x^2+y^2)dy$, where C is the square bounded by the lines x=-1,x=1,y=-1,y=1 using Green's theorem. (10M)

(OR)

18. Use divergence theorem to evaluate $\vec{F} = 4x\vec{\imath} - 2y^2\vec{\jmath} + z^2\vec{k}$ and S is the surface bounded the region x^2+y^2=4, z=0 and z=3. (10M)

19. (a) Evaluate $L^{-1}\left[\frac{1}{s^2+6s+1}\right]$. (5M)

(b) Find the Laplace transform of $f(t) = \frac{1-e^{-t}}{t}$. (5M)

(OR)

20. Using Laplace transform method $(D^2+1)y = t$ given that $y(0) = 1$; $y^I(0) = 0$. (10M)