R17 Regulation *Subject Code: 1B1AB*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech. I Year I Semester Supplementary Examinations, June 2024

MATHEMATICS –II

(Common to Civil Engineering &Mechanical Engineering)

Maximum Marks:70 Date:27.06.2024 Duration: 3hours

Part-A

Answer all the following questions 10X2M=20 Marks

1. $\int_0^1 \frac{x}{\sqrt{1-x^2}}$ dx evaluate in terms of beta function.
2. Compute $\lceil 11/2$
3. Evaluate $\int_0^a \int_0^{\sqrt{a^2-y^2}} \sqrt{a^2-x^2-y^2}$ dx dy.
4. Evaluate $\int_0^1 dx \int_0^2 dy \int_1^2 x^2\, yz\ dz$
5. If $\bar{f}$= (x+3y) $\bar{\imath}$ + (y-2z) $\bar{\jmath}$ + (x+pz) $\bar{k}$ is solenoidal, find P.
6. Find (A.∇) $\emptyset$ at (1,-1,1) if A = $3xyz^2\,\bar{\imath} + 2xy^3\bar{\jmath} - x^2yz\,\bar{k}$ and $\emptyset = 3x^2 - yz$.
7. Evaluate $\int_C \bar{F}.d\bar{r}$ where $\bar{F} = x^2\bar{\imath} + y^2\bar{\jmath}$ and C is the curve $y = x^2$ in the xy – plane from (0,0) to (1,1)
8. State Green's theorem.
9. If L {f(t)} = $\bar{f}$(s), then L $\{e^{at}$f(t)} = $\bar{f}$(s-a), s-a > 0
10. Find $L^{-1}\{\frac{s}{s^2-a^2}\}$

Part-B

Answer all the following questions 5X10M=50M

11. Evaluate $\int_0^{\pi/2} sin^5\theta\ cos^{7/2}\theta\ d\theta$ [10M]

(OR)

12. Show that B (m,n) = $\int_0^\infty \frac{x^{m-1}}{(1+x)^{m+n}}\ dx = \int_0^\infty \frac{x^{n-1}}{(1+x)^{m+n}}$ dx [10M]

13. Change the order of integration and evaluate $\int_0^{4a} \int_{x^2/4a}^{2\sqrt{ax}} dy\ dx$ [10M]

(OR)

14. Evaluate $\int_0^2 \int_0^{\sqrt{2x-x^2}} (x^2 + y^2)\ dx\ dy$ by changing in to polar co-ordinates. [10M]

15. Evaluate $\nabla.(\frac{\bar{r}}{r^3})$ where $\bar{r} = x\bar{\imath} + y\,\bar{\jmath} + z\,\bar{k}$, and $r = |\bar{r}|$ [10M]

(OR)

16. Prove that $\nabla \times (\nabla \times \bar{a}) = \nabla(\nabla.\bar{a}) - \nabla^2\bar{a}$ [10M]

17. Find the work done in moving in a particle in the force field $\bar{F} = 3x^2\bar{\imath} + (2zx - y)\,\bar{\jmath} + z\,\bar{k}$, Along the curve defined by $x^2 = 4y$, $3x^3 = 8z$ from $x = 0$ to $x = 2$. [10M]

(OR)

18. Verify stokes theorem for the function $\bar{F} = x^2\bar{\imath} + xy\,\bar{\jmath}$ integrated round the square in the Plane $z = 0$ whose sides are along the lines $x = 0$, $y = 0$, $x = a$, $y = a$. [10M]

19. (a). Find L $\{\frac{cos2t - cos3}{t}\}$ [5M]

(b). Find inverse Laplace transform of $\frac{5s-2}{s^2(s+2)(s-1)}$ [5M]

(OR)

20. Find L {f(t)} where f(t) is given by $f(t) = t$, $0 < t < b$ and $f(t) = 2b - t$, $b < t < 2b$, 2b being The period of f (t). [10M]