R17 Regulation

Subject: 1B1AB

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous, Accredited by NAAC with 'A' Grade)

B.Tech. I Year I Semester Supplementary Examinations, July 2023

MATHEMATICS-II

(Common to Civil Engineering & Mechanical Engineering)

Maximum Marks: 70 Date: 06.04.2023 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. Show that $\Gamma\left(\frac{1}{2}\right) = \sqrt{\pi}$
2. Find the value of $\beta(2,3)$
3. Compute the value of $\int_0^{\pi}\int_0^{sin\theta} r dr d\theta$
4. Evaluate $\int_0^1\int_1^2 (xy) dy dx$
5. Find div F and curl F where F = grad $(x^3 + y^3 + z^3 - 3xyz)$.
6. What is the value of $div\,\vec{r}$?
7. State Stoke's theorem.
8. Find the work done by $\overline{f} = 3x^2\,i + (2xz\text{-}y)\,j + z\,k$ along the straight line from (0, 0, 0) to (2, 1, 3).
9. State second shifting theorem in Laplace transform.
10. State convolution theorem in Laplace transform.

Part-B

Answer all the questions 5X10M=50M

11. Prove the relation between Beta and Gamma function. (10M)

(OR)

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

13. Explain about double and triple integrals. (10M)

(OR)

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

15. a) Prove that $\nabla^2(r^2) = n\,(n+1)\,r^{n-2}$ (5M)

b) Evaluate $\nabla.(\frac{\bar{r}}{r^3})$ when $\bar{r} = x\bar{\imath} + y\,\bar{\jmath} + z\bar{k}$ and $\bar{r} = |\bar{r}|$ (5M)

(OR)

16. P.T div curl $\bar{f} = 0$ and (b) P.T (Δf X Δg) is Solenoidal. (10M)

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 $\int_V divFdv$ where $\vec{F} = 4x\vec{\imath} - 2y^2\vec{\jmath} + z^2\vec{k}$ and S is the surface bounded the region x^2+y^2=4, z=0 and z=3. (10M)

19. (a) Evaluate $L^{-1}\left[\frac{s^2}{(s^2+4)(s^2+25)}\right]$. (5M)

(b) Find L{te^{2t}sin3t} (5M)

(OR)

20. Solve the differential equation $\frac{d^2y}{dt^2} - 3\frac{dy}{dt} + 2y = e^{2t}$ with y(0) = -3 and $y'(0) = 5$ using Laplace transform. (10M)