



R17 Regulation **Subject code: 1B1AB**
TKR COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous, Accredited by NAAC with 'A' Grade)

B.Tech I Semester Supplementary Examinations, April 2022

Mathematics – II
(Common to CE & ME)

Maximum Marks: 70

Date: 02.05.2022 Duration: 3 hours

- 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 which carries 10M.
 4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

Answer all the following questions

10X2M=20 Marks

1. Write the relation between Beta and Gamma function.
2. Find $\Gamma\left(\frac{3}{2}\right)$
3. Define triple integral over a region.
4. Define double integral.
5. If $\vec{f} = (x+3y)\vec{i} + (y-2z)\vec{j} + (x+pz)\vec{k}$ is solenoidal, find P
6. Find $(A \cdot \nabla) \phi$ at (1,-1,1) if $A = 3xyz^2\vec{i} + 2xy^3\vec{j} - x^2yz\vec{k}$ and $\phi = 3x^2 - yz$.
7. Evaluate $\int_C \vec{F} \cdot d\vec{r}$ where $\vec{F} = x^2\vec{i} + y^2\vec{j}$ 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 $L^{-1}\left\{\frac{s}{s^2-a^2}\right\}$

Part-B

Answer all the following questions

5x10M=50 Marks

11. Evaluate $\int_0^1 x^2 \left(\log \frac{1}{x}\right)^3 dx$. [10]

OR

12. S.T $\beta(m, n) = \int_0^\infty \frac{x^{m-1}}{(1+x)^{m+n}} dx$ [10]

13. Find $\int \int_R x^2 dx dy$ over the region bounded by hyperbola $xy=4$; $y = 0$; $x = 1$; $x = 4$. [10]

OR

14. Evaluate $\int_0^1 \int_0^x \int_0^{x+y} (x+y) dz dy dx$ [10]

15. Evaluate $\nabla \cdot \left(\frac{\vec{r}}{r^3}\right)$ where $\vec{r} = x\vec{i} + y\vec{j} + z\vec{k}$, and $r = |\vec{r}|$ [10]

OR

16. a) Prove that if \vec{r} is the position vector of any point in space, then $r^n \cdot \vec{r}$ is irrotational.

b) Prove that $\nabla \times (\nabla \times \vec{a}) = \nabla (\nabla \cdot \vec{a}) - \nabla^2 \vec{a}$ [5+5]

17. Verify divergence theorem for $2x^2 y \vec{i} - y^2 \vec{j} + 4xz^2 \vec{k}$ taken over the region of first octant of the cylinder $y^2 + z^2 = 9$ and $x = 2$. [10]

OR

18. Evaluate the line integral $\int (x^2 + xy) dx + (x^2 + y^2) dy$ where C is the square formed by the lines $x = \pm 1$ and $y = \pm 1$. [10]

19. a) Find $L \left\{ \frac{\cos 2t - \cos 3t}{t} \right\}$

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

OR

20. Using convolution theorem find $L^{-1} \left\{ \frac{1}{(s^2+a^2)^2} \right\}$ [10]