



Regulation R18

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

Subject code:2B2AA

B.Tech II Semester Supplementary Examinations, September 2023

ENGINEERING MATHEMATICS- II

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

Maximum Marks: 70

Date:14.09.2023 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.
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 solve $(x^2 + 2xy) dx + (y^2 + 2xy) dy$
- 2 State Newtons law of cooling
- 3 Find P.I of $(D^2 + 9) y = \sin 2x$
- 4 Find the P.I of $f(D) y = Q(x)$ where $Q(x) = \sin bx$ (or) $\cos bx$, where 'b' is a constant.
- 5 Prove $L \{e^{at}f(t)\} = \bar{f}(s-a), s-a > 0$, if $L \{f(t)\} = \bar{f}(s)$,
- 6 Find $L^{-1} \left\{ \frac{s}{s^2 - a^2} \right\}$
- 7 Prove $\bar{f} = (x+3y)\bar{i} + (y-2z)\bar{j} + (x+pz)\bar{k}$ is solenoidal, find P
- 8 Find $(A \cdot \nabla) \phi$ at $(1, -1, 1)$ if $A = 3xyz^2\bar{i} + 2xy^3 - x^2yz\bar{k}$ and $\phi = 3x^2 - yz$
- 9 Evaluate $\int_C \bar{F} \cdot d\bar{r}$ where $\bar{F} = x^2\bar{i} + y^2\bar{j}$ and C is the curve $y = x^2$ in the xy - plane from $(0,0)$ to $(1,1)$

- 10 What is the Statement of Green's theorem

Part-B

Answer All the following questions.

(5X10M=50Marks)

- 11 Solve $y(1 + xy)dx + x(1 - xy)dy = 0$ 10
OR
- 12 Apply the law of natural growth to solve: number 'N' of bacteria in a culture grew at a rate proportional to 'N'. The value of 'N' was initially 100 and increased to 332 in 1 hour. What was the value of 'N' after 1.5 hours? 10
- 13 Solve by the method of variation of parameters $(D^2 + a^2)y = \tan ax$ 10
OR
- 14 Solve $(x^2 D^2 - 4xD + 6) y = x^2$ 10
- 15 Solve by Laplace transform $\frac{d^2y}{dx^2} + 5\frac{dy}{dx} + 6y = 0; y(0) = 0, y^1(0) = 1$ 10

OR

- 16 Make use of convolution theorem find 10
 $L^{-1}\left\{\frac{1}{(s^2+a^2)^2}\right\}$
- 17 Prove that $\nabla \times (\nabla \times \bar{a}) = \nabla (\nabla \cdot \bar{a}) - \nabla^2 \bar{a}$ 10
- OR
- 18 Prove that if \bar{r} is the position vector of any point in space, then $r^n \cdot \bar{r}$ is irrotational. 10
- 19 Evaluate by Green's theorem $\oint_C (y - \sin x) dx + \cos x dy$ where C is the triangle 10
 Enclosed by lines $y = 0, x = \pi/2; \pi y = 2x$.
- OR
- 20 Evaluate the line integral $\int (x^2 + xy) dx + (x^2 + y^2) dy$ where C is the square 10
 formed by the lines $x = \pm 1$ and $y = \pm 1$.