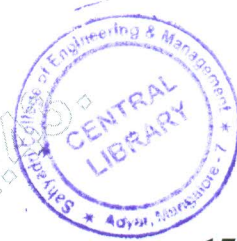


# CBCS Scheme



USN

--	--	--	--	--	--	--	--	--	--

17MAT21

## Second Semester B.E. Degree Examination, June/July 2018 Engineering Mathematics – II

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing one full question from each module.

### Module-1

- 1
- a. Solve  $\frac{d^2y}{dx^2} - 6\frac{dy}{dx} + 9y = 6e^{3x}$ . (06 Marks)
- b. Solve  $\frac{d^3y}{dx^3} + \frac{d^2y}{dx^2} - 4\frac{dy}{dx} - 4y = 3e^x$ . (07 Marks)
- c. Solve by the method of variation of parameter  $y'' + y = \frac{1}{1 + \sin x}$ . (07 Marks)

OR

- 2
- a. Solve  $\frac{d^2y}{dx^2} - 6\frac{dy}{dx} + 25y = e^{2x} + \sin x + x$ . (06 Marks)
- b. Solve  $y'' + 4y' + 5y = -2\cosh x$ ; find  $y$  when  $y = 0$  and  $\frac{dy}{dx} = 1$  at  $x = 0$ . (07 Marks)
- c. Solve by the method of undetermined coefficient  $(D^2 - 3D + 2)y = x^2 + e^x$ . (07 Marks)

### Module-2

- 3
- a. Solve  $x\frac{d^2y}{dx^2} - \frac{2y}{x} = x + \frac{1}{x^2}$ . (06 Marks)
- b. Solve  $\frac{dy}{dx} - \frac{dx}{dy} = \frac{x}{y} - \frac{y}{x}$ . (07 Marks)
- c. Find the general and singular solution for  $xp^2 + xp - yp + 1 - y = 0$ . (07 Marks)

OR

- 4
- a. Solve  $(2x + 3)^2 y'' - (2x + 3)y' - 12y = 6x$ . (06 Marks)
- b. Solve  $xy \left\{ \left( \frac{dy}{dx} \right)^2 + 1 \right\} = (x^2 + y^2) \frac{dy}{dx}$ . (07 Marks)
- c. Find the general solution by reducing to Clairaut's form  $(px - y)(x + py) = 2p$  using  $U = x^2$  and  $V = y^2$ . (07 Marks)

### Module-3

- 5
- a. Find the partial differential equation of all spheres  $(x - a)^2 + (y - b)^2 + z^2 = c^2$ . (06 Marks)
- b. Solve  $\frac{\partial^2 z}{\partial x \partial y} = \sin x \sin y$  for which  $\frac{\partial z}{\partial y} = -2\sin y$  when  $x = 0$  and  $z = 0$  when  $y$  is an odd multiple of  $\frac{\pi}{2}$ . (07 Marks)
- c. Derive one dimensional wave equation with usual notations. (07 Marks)



17MAT21

OR

- 6 a. Form the partial differential equation by eliminating the arbitrary function from  $z = y\phi(x) + x\psi(y)$ . (06 Marks)
- b. Solve  $\frac{\partial^2 z}{\partial y^2} = z$ ; given that when  $y = 0$ ,  $z = e^x$  and  $\frac{\partial z}{\partial y} = e^{-x}$ . (07 Marks)
- c. Find the various possible solution for one dimensional heat equation by the method of separation of variables. (07 Marks)

**Module-4**

- 7 a. Prove that  $\Gamma(1/2) = \sqrt{\pi}$ . (06 Marks)
- b. Evaluate  $\int_0^1 \int_0^{\sqrt{1-x^2}} \int_0^{\sqrt{1-x^2-y^2}} xyz \, dz \, dy \, dx$  (07 Marks)
- c. Evaluate  $\iint xy(x+y) \, dx \, dy$  over the area between  $y = x^2$  and  $y = x$ . (07 Marks)

OR

- 8 a. Evaluate  $\int_0^{\infty} \int_x^{\infty} \frac{e^{-y}}{y} \, dy \, dx$  by changing the order of integration. (06 Marks)
- b. Show that the area between the parabolas  $y^2 = 4ax$  and  $x^2 = 4ay$  is  $\frac{16}{3}a^2$ . (07 Marks)
- c. Prove that with usual notations  $\beta(m, n) = \frac{\Gamma(m)\Gamma(n)}{\Gamma(m+n)}$ . (07 Marks)

**Module-5**

- 9 a. Find the Laplace transform of  $\frac{\cos 2t - \cos 3t}{t}$ . (06 Marks)
- b. Express the function in terms of unit step function and hence find its Laplace transform
- $$f(t) = \begin{cases} \cos t & 0 < t < \pi \\ 1 & \pi < t < 2\pi \\ \sin t & t > 2\pi \end{cases}$$
- (07 Marks)
- c. Find  $L^{-1}\left\{\frac{s+3}{s^2-4s+13} + \log_e\left(\frac{s+1}{s-1}\right)\right\}$ . (07 Marks)

OR

- 10 a. Find the Laplace transform of the periodic function
- $$f(t) = \begin{cases} t & 0 < t < \pi \\ \pi - t & \pi < t < 2\pi \end{cases}$$
- of period  $2\pi$ . (06 Marks)
- b. Using convolution theorem obtain the inverse Laplace transform of  $\frac{s}{(s+2)(s^2+9)}$ . (07 Marks)
- c. Solve the equation  $y'' - 3y' + 2y = e^{3t}$ ;  $y(0) = 1$  and  $y'(0) = 0$  using Laplace transform technique. (07 Marks)

\*\*\*\*\*