

**Government College of Engineering, Aurangabad**

(An autonomous Institute of Government of Maharashtra)

S.E. (ALL) Old

End Semester Examination

**GE 201 : ENGINEERING MATHEMATICS III**

Time: Three hours ]

**1 NOV 2016**

[ Max Marks : 60

*"Verify the Course code and check whether you have got the correct question paper"*

**N.B.**

1. All questions are compulsory
2. Figures to the right indicate full marks.
3. Assume suitable data if necessary and state it clearly.
4. Use of non programmable calculator is allowed

**Q.1. Attempt any two of the following** (12)

(a) Solve by method of variation of parameters

$$(D^2 + 4)y = \tan 2x$$

(b) Solve  $(D^2 + 13D + 36)y = e^{4x} + 2$

(c) Solve  $(x^3D^3 + 3x^2D^2 + xD)y = 24x^2$

**Q.2. Attempt any two of the following** (12)

(a) Find directional derivative of  $\phi = 4xz^3 - 3x^2y^2z$  at  $(2, -2, 2)$  in the direction of  $\nabla(x^2y^2z^2)$  at  $(1, -1, 1)$

(b) Show that the vector field  $\vec{F} = (x^2 - yz)i + (y^2 - zx)j + (z^2 - xy)k$  is conservative. Find the scalar function of  $\phi$  such that  $\vec{F} = \nabla\phi$ .

(c) If  $\vec{F} = (2y + 3)i + xzj + (yz - x)k$ , find  $\int_C \vec{F} \cdot d\vec{r}$ , where  $C$  is the curve  $x = 2t^2$ ,  $y = t$ ,  $z = t^3$  from  $t = 0$  to  $t = 1$

**Q.3. Attempt any two of the following** (12)

(a) Evaluate  $\int_0^{\infty} \frac{e^{-t} \sin(\sqrt{3})t}{t} dt$

(b) Find inverse Laplace transform of  $\frac{e^{-s}}{s(s^2 + 4)}$

(c) Show by Laplace transform  $\frac{dy}{dt} + 3y = 10 \sin t$ ,  $y(0) = 0$

**Q.4. Attempt any two of the following**

**(12)**

(a) Solve the integral equation  $\int_0^{\infty} f(x) \cos \lambda x \, dx = \begin{cases} 1 - \lambda, & 0 \leq \lambda \leq 1 \\ 0, & \lambda > 1 \end{cases}$

(b) Find Fourier sine and cosine transform of  $f(x) = e^{-x}, \quad x > 0$

(c) Find Fourier sine integral representation of the function  $f(x) = e^{-x} + e^{-2x}, \quad x > 0$

**Q.5. Attempt any two of the following**

**(12)**

(a) Find  $\beta_1$  and  $\beta_2$  for the following data

x	0	1	2	3	4	5	6	7	8
y	2	8	18	25	40	25	18	8	2

(b) Find a straight line  $y = a + bx$  by least square method

x	1	2	3	4	5
y	2	3	4	5	6

(c) The equation of line of regression of variable  $x$  and  $y$  are  $x = 19.13 - 0.87y$  and  $y = 11.64 - 0.50x$ . Find  $\bar{x}$ ,  $\bar{y}$  and  $r$ .