Roll. No. ____________ Enroll. No. ____________

SILVER OAK COLLEGE OF ENGINEERING & TECHNOLOGY

ADITYA SILVER OAK INSTITUTE OF TECHNOLOGY

BE - SEMESTER–II • MID-II EXAMINATION – SUMMER 2019

SUBJECT: MATHEMATICS-2 (3110015) (ALL BRANCH)

DATE: 30-04-2019 TIME: 10:30 AM To 12:15 PM TOTAL MARKS: 40

Instructions:
1. All the questions are compulsory.
2. Figures to the right indicate full marks.
3. Assume suitable data if required.

Q.1 (a) Use the method of variation of parameters to find the general solution of $y'' + 2y' + y = e^{-x} sinx$. [04]

(b) If $\overline{F} = (y^2 - z^2 + 3yz - 2x)\hat{\imath} + (3xz + 2xy)\hat{\jmath} + (3xy - 2xz + 2z)\hat{k}$ then verify that $\overline{F}$ is both solenoidal and irrotational. [04]

(c) Find the work done by force $\overline{F} = (3x^2 - 3x)\hat{\imath} + (3z)\hat{\jmath} + (3xyz)\hat{k}$ along the straight line $t\hat{\imath} + t\hat{\jmath} + t\hat{k}$,$0 < t < 1$. [04]

Q.2 (a) If $\emptyset = xz - 2xy^2z + x^2yz^2$, find $div(grad\ \emptyset)$ at the point (-1,2,3). [03]

(b) If $\bar{F} = (3x^2 + 6y)\hat{\imath} - yz\hat{\jmath} + xz^2\hat{k}$, evaluate $\int_c \bar{F} d\bar{r}$ from $(0,0,0)$ to $(1,1,1)$ along the curve c given by $x = t, y = t^2, z = t^3$. [04]

(c) Solve the following differential equation using the method of undetermined coefficient: $y'' - 2y' + 5y = 5x^3 - 6x^2 + 6x$. [07]

OR

Q.2 (a) If $\overline{F} = (e^x \cos y + yz)\,\hat{\imath} + (xz - e^x siny)\hat{\jmath} + (xy + z)\hat{k}$ is conservative and find its scalar potential function. [03]

(b) Find the flux of $\overline{F} = 3xy\hat{\imath} + (x - y)\hat{\jmath}$ through the parabolic arc $y = x^2$ between $(-1,1)$ and $(4,16)$. [04]

(c) Solve $x^2 \frac{d^2y}{dx^2} + 4x\frac{dy}{dx} + 2y = x^2 \sin(lnx)$. [07]

Q.3 (a) Find the $Curl\ \bar{F}$ if $\overline{F} = (ze^{2xy})\hat{\imath} + (2xycosy)\hat{\jmath} + (x + 2y)\hat{k}$, at the point (2,0,3). [03]

(b) Express $f(x) = \begin{cases} sinx\ ; 0 \le x \le \pi \\ 0\ ; x > \pi \end{cases}$ as fourier sine integral and evaluate $\int_0^\infty \frac{\sin\lambda x \sin\pi\lambda}{1-\lambda^2} d\lambda$. [04]

(c) Verify Green's theorem for $\overline{F} = (x + y)\hat{\imath} + 2xy\hat{\jmath}$, c is the rectangle in the xy -plane bounded by $x = 0, x = a, y = 0, y = b$. [07]

OR

Q.3 (a) Find the arc length of the portion of the circular helix $\bar{r} = cost\ \hat{\imath} + sint\ \hat{\jmath} + t\hat{k}$ from $t = 0$ to $t = \pi$. [03]

(b) Verify Green's theorem for $\bar{F} = (x - y)\hat{\imath} + (x)\hat{\jmath}$ where c is $x^2 + y^2 = 1$ [04]

(c) Express the function $f(x) = \begin{cases} 1\ ; |x| < 1 \\ 0\ ; |x| > 1 \end{cases}$ as a fourier integral and hence evaluate [07]

1) $\int_0^\infty \frac{sin\omega\ cos\omega x}{\omega}\ d\omega$ 2) $\int_0^\infty \frac{sin\omega}{\omega}\ d\omega$