EARS/ 2118

Total No. of Questions – [ 4 ] Total No. of Printed Pages :2

| G.R. No. | |
|---|---|

Paper Code :- U127-101 (T1)

# FEBRUARY 2018 / IN - SEM (T1)
# F. Y. B.TECH. (COMMON) (SEMESTER - II)
# COURSE NAME : Engineering Mathematics-II
# (2017 PATTERN)

Time : [1 Hour] [Max. Marks : 30]

**(*) Instructions to candidates:**
1) **Answer Q.1 OR Q.2, Q.3 OR Q.4**
2) **Figures to the right indicate full marks.**
3) **Use of scientific calculator is allowed**
4) **Use suitable data where ever required**

Q 1) a) Solve : $\frac{dy}{dx} + x\sin 2y = x^3 \cos^2 y$ [6]

b) Find orthogonal trajectory for r = a (1+ cos θ) [6]

c) Solve: $\left(\log(x^2+y^2) + \frac{2xy}{x^2+y^2}\right)dx + \frac{2xy}{x^2+y^2}dy = 0$ [4]

**OR**

Q2) a) Solve : $e^y\left(1+\frac{dy}{dx}\right) = e^x$ [6]

b)The equation of an L-R circuit is given by $L\frac{dI}{dt} + RI = 10 \sin t$.
If I = 0 at t = 0, express *I* as a function of t. [6]

c) Solve: $\frac{dy}{dx} + \frac{ax+hy+g}{hx+by+f} = 0$ [4]

Q3) a) Find Fourier series for f(x) = x sin x in $(-\pi, \pi)$ [6]

b) Find half range sine series f(x) = x if $0 < x < \pi/2$.
= $\pi$ -x if $\pi/2 < x < \pi$. [4]

c)If the water temperature at $100^0$C cools in 10 minutes to $88^0$ C in a room of temperature $25^0$ C, find the temp of water after 20 minutes. [4]

**OR**

P.T.O.

Q4) a) Find Fourier series for $f(x) = \sin x$ if $0 < x < \pi$ [6]

$= 0$ if $\pi < x < 2\pi$

b)Obtain the constant term and the coefficients of first cosine and sine harmonics in the expansion of y from table. [4]

| x | 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| y | 9 | 18 | 24 | 28 | 26 | 20 |

c) The distance $x$ descended by a parachuter satisfies the differential equation $v\frac{dv}{dx} = g\left(1 - \frac{v^2}{k^2}\right)$ where $v$ is velocity, $k$, $g$ constants. If $v = 0$ and $x = 0$ at time $t = 0$, show that $x = \frac{k^2}{g}\log cosh\left(\frac{gt}{k}\right)$. [4]

ALL THE BEST