



Enrolment No. _____

HASMUKH GOSWAMI COLLEGE OF ENGINEERING, VAHELAL

MID SEMESTER EXAMINATION, SEPTEMBER-2016

Subject Code: 2130002

Date: 23/09/2016

Subject Name: AEM

Sem.: 3RD (All Branch)

Time: 10:00 TO 11:00

Total Marks: 20

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

QUE.1 (A) (i) Find general solution of $y^{(v)} - 5y^{(iv)} + 10y''' - 10y'' + 5y' - y = 0$ 3
(ii) Solve Differential equation $y'' - 2y' = 0$ $y(0) = y'(0) = 0$
(iii) Find $L[t \sin(3t)\sin(t)]$

(B) Find Laplace transform of $L[t^2 e^{-2t} \cos^3(t)]$ 3

QUE.2 (A) Is the function $(x) = x + |x|$, $-\pi \leq x \leq \pi$ even or odd? Find its Fourier series over the interval mentioned. 3

(B) For the function $f(x) = \begin{cases} x & 0 < x < 2 \\ 4 - x & 2 < x < 4 \end{cases}$, find its Fourier series. Hence deduce that $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \frac{1}{7^2} + \dots = \frac{\pi^2}{16}$ 4

OR

(B) Find the Fourier Sin series for $f(x) = \pi x - x^2$ in interval $(0, \pi)$ 4

QUE.3 (A) Find Laplace transform of $f(t)$ where $f(t) = \begin{cases} 3 & 0 < t < \pi \\ t^2 & t \geq \pi \end{cases}$ 3

(B) Solve: $(D^2 + 1)^3 y = \cos(t) + e^{-t}$ 4

OR

(A) Find $L \left[\int_0^t e^u \left(\frac{u + \sin(u)}{u} \right) du \right]$ 3

(B) Express the function $f(x) = \begin{cases} 1 & \text{for } |x| < 1 \\ 0 & \text{for } |x| > 1 \end{cases}$ as a Fourier Integral. Hence evaluate $\int_0^\infty \frac{\sin \lambda \cos \lambda x}{\lambda} d\lambda$ 4

***** ALL THE BEST *****