(DME 211)

B. Tech. DEGREE EXAMINATION, MAY - 2015

(Examination at the end of Second Year)

MECHANICAL ENGINEERING

Paper - I : Engineering Mathematics - III

Time : 3 Hours **Maximum Marks : 75**

Answer question No.1 compulsory ***(15 × 1 = 15)***

Answer ONE question from each unit ***(4 × 15 = 60)***

1) a) Define periodic function.

b) Define even function with examples.

c) Write half range cosine for the $f(x)$

d) Write parseval's formula.

e) Define fourier transform.

f) Define uniform distribution.

g) Write probability distribution function weibull distribution.

h) Define population.

i) Define Alternative hypothesis.

j) Define Interval estimation.

k) Define standard error.

l) Write formula test two-means.

m) Define standard normal distribution.

n) Write statement of linear property in fourier transform.

o) Define inverse fourier cosine transform.

UNIT - I

2) a) Find the complex form of the fourier series $f(x) = x^2 - \pi < x < \pi$

b) Obtain the fourier series expansion of $f(x) = x \cos x$ as a sine series in $(0, \pi)$.

OR

c) Obtain the fourier series expansion of $f(x) = x - x^2 - \pi < x < \pi$. Hence show that

$$\frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} \ldots\ldots\ldots\ldots = \pi^2/12$$

UNIT – II

3) a) Find the fourier transform of $f(x)$ defined by $f(x) = \begin{cases} 1 - x^2 & |x| < 1 \\ 0 & |x| > 1 \end{cases}$ and evaluate :

i) $\int_0^\infty \frac{x\cos x - \sin x}{x^3} \cos\frac{x}{2} dx$

ii) $\int_0^\infty \frac{x\cos x - \sin x}{x^3} dx$

OR

b) Find the Fourier sine transform of $f(x) = \begin{cases} x & 0 \le x < l \\ 0 & x > l \end{cases}$

c) Find the Fourier cosine transform of e^{-5x}.

UNIT – III

4) a) A sample of 400 items is taken from a population whose standard deviation is 10. The mean of the sample is 40. Test whether the sample has come from a population with mean 38.

b) It is claimed that a random sample of 49 tyres has a mean life of 15200 km this sample was drawn. From a population whose mean is 15150 kms and a standard deviation of 1200 km. Test the significance at 0.05 level.

OR

c) Two means of large samples of sizes 1000 and 2000 members are 67.5 inches and 68.0 inches respectively can the sample be regarded as drawn from the same population of S.D. 2.5 inches.

d) Given the following information relating to two places A and B. Test whether there is any significant difference between their mean wages :

1.	2. A	3. B
4. Mean wages	5. 47	6. 49
7. S.D.	8. 28	9. 40
10. Number of workers	11. 1000	12. 1500

UNIT - IV

5) To examine the hypothesis that the husband are more intelligent than the wifes, an investigator took a sample of 10 couples and administered them a test which measures the I.Q The results as follows.

Husbands	117	105	97	105	123	109	86	78	103	107
Wifes	106	98	87	104	116	95	90	69	108	85

Test the hypothesis with a reasonable test 5% LOS.

⌘⌘⌘