B. Tech. Sem - IV (Production) CBCS - 2014 course

SUBJECT : ENGINEERING MATHEMATICS – III

Day : Monday Winter - 2017 Time : 2.30 P.M. To 5.30 P.M.

Date : 20-11-2017 W2017 - 2098 Max. Marks : 60

N.B.:

1) All questions are **COMPULSORY**.
2) Figures to the right indicate **FULL** marks.
3) Use of nonprogrammable **CALCULATOR** is allowed.
4) Assume suitable data if necessary.

Q.1 **a)** Solve : $\left(D^2-6D+9\right)y=6e^{3x}+7e^{-2x}$. **[05]**

b) Solve : $\left(D^2-4D+3\right)y=x^3e^{2x}$. **[05]**

OR

a) Solve by the method of variation of parameters $\left(D^2-2D+2\right)y=e^x\tan x$. **[05]**

b) Solve : $x^2\frac{d^2y}{dx^2}-4x\frac{dy}{dx}+6y=x^5$. **[05]**

Q.2 **a)** Evaluate using Laplace transform of $\int_0^\infty e^{-t}\frac{\sin t}{t}\,dt$. **[05]**

b) Obtain the Laplace transform of $te^{4t}\sin 2t$. **[05]**

OR

Using inverse Fourier sine transform, find $f(x)$, if $F_S(\lambda)=\frac{\lambda}{1+\lambda^2}$. **[10]**

Q.3 Solve $\frac{\partial u}{\partial t}=a^2\frac{\partial^2 u}{\partial x^2}$ subject to the following boundary conditions: **[10]**

i) u (0, t) = 0; ∀t

ii) u (l, t) = 0; ∀t

iii) $u(x,0)=\begin{cases}x & ;\ 0\le x\le l/2\\ l-x; & l/2\le x\le l\end{cases}$

iv) u (x, ∞) is not infinite

OR

A tightly stretched string with fixed end points x = 0 and x = l is initially in a position given by $y(x,0)=y_0\sin^3\left(\frac{\lambda x}{l}\right)$. If it is released from rest from this position, find the displacement y at any distance x from one end and at any time t. **[10]**

P.T.O.

Q.4 The following are runs scored by two batsman A and B in ten innings: **[10]**

Batsman A	101	27	0	36	82	45	7	13	65	14
Batsman B	97	12	40	96	13	8	85	8	56	15

Who is more consistent batsman?

OR

Calculate the four moments of the following distribution about the mean and hence find β_1 and β_2. **[10]**

x	0	1	2	3	4	5	6	7	8
f	1	8	28	56	70	56	28	8	1

Q.5 a) Ten students got the following percentage of marks in two papers of statistics: **[05]**

Paper I	78	36	98	25	75	82	90	62	65	39
Paper II	84	51	91	60	68	62	86	58	53	47

Calculate co-efficient of correlation.

b) Given $r = 0.9$, $\sum xy = 70$, $\sigma_y = 3.5$, $\sum x^2 = 100$. Find the number of item, if x and y are deviations from arithmetic mean. **[05]**

OR

Calculate the regression equation of x on y and y on x from the following data and estimate x when $y = 25$ and estimate y when $x = 20$. **[10]**

x	10	12	13	17	18	20	24	30
y	5	6	7	9	13	15	20	21

Q.6 a) A can hit a target 3 times in 5 shots, B can hit a target 2 times in 5 shots and C can hit a target 3 times in 4 shots. What is the probability that atleast two shots hit? **[05]**

b) In 200 sets of 12 tosses of a coin, in how many cases one can expect 8 heads and 4 tails. **[05]**

OR

a) Assume that probability of an individual coal miner being killed in a mine accident during a year is $\frac{1}{2400}$. Calculate the probability that in mine employing 200 miners, there will be at least one will killed by accident in a year. **[05]**

b) In a sample of 1000 cases, the mean of certain test is 14 and Standard Deviation is 25. Assuming the distribution is normal. Find how many students between 12 and 15. (Given : A(z = 0.08) = 0.0319 and A(z = 0.04) = 0.0160). **[05]**

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