

B.TECH. SEM -IV PRODUCTION 2014 COURSE (CBCS) :
SUMMER - 2018
SUBJECT: ENGINEERING MATHEMATICS-III

Day: **Saturday**
Date: **02/06/2018**

S-2018-2306

Time: **10.00 AM TO 01.00 PM**
Max. Marks: 60

N.B:

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

Q.1 a) Solve: $(D^2 - 4D + 4)y = e^{2x} \sin 3x$. **(05)**

b) Solve: $(D^2 - 3D + 2)y = x^2$. **(05)**

OR

a) Solve the differential equations $\frac{d^2 y}{dx^2} - 2 \frac{dy}{dx} + 2y = e^x \tan x$ by the method of variation of parameters. **(05)**

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

Q.2 a) Using partial fractions, find the inverse Laplace transforms of $\frac{3s+1}{(s-1)(s^2+1)}$. **(05)**

b) Evaluate using Laplace transform, $\int_0^{\infty} t e^{-3t} \sin t dt$. **(05)**

OR

a) Using Laplace Transform solve the following differential equation $\frac{d^2 y}{dt^2} + y(t) = 0$, $y(0) = 1$, $y'(0) = 2$. **(05)**

b) Find the value using convolution theorem for $f(t) = t$, $g(t) = e^{at}$. **(05)**

Q.3 A string is stretched and fastened to two points distance l apart is displaced into the form $y(x, 0) = 3(lx - x^2)$ from which it is released at $t = 0$. Find the displacement of the string at a distance x from one end. **(10)**

OR

Solve $\frac{\partial u}{\partial t} = a^2 \frac{\partial^2 u}{\partial x^2}$ subject to the following conditions: **(10)**

i) $u(0, t) = 0; \forall t$

ii) $u(l, t) = 0; \forall t$

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

iv) $u(x, \infty)$ is not infinite

P.T.O.

Q.4 The scores obtained by two batsman A and B is to matches are given below: **(10)**

| | | | | | | | | | | |
|---|----|----|----|----|----|----|----|----|----|----|
| A | 30 | 44 | 66 | 62 | 60 | 34 | 80 | 46 | 20 | 38 |
| B | 34 | 46 | 70 | 38 | 55 | 48 | 60 | 34 | 45 | 30 |

Calculating mean, S.D. and coefficient of variation for each batsman, determine who is more efficient and who is more consistent.

OR

Q.4 Calculate the four moment of the following distribution about the mean and hence find β_1 and β_2 **(10)**

| | | | | | | | | | |
|-------|---|---|----|----|----|----|----|---|---|
| x_i | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| f_i | 1 | 8 | 28 | 56 | 70 | 56 | 28 | 8 | 1 |

Q.5 a) Find the correlation coefficient between x and y from the given data. **(05)**

| | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| x | 78 | 89 | 97 | 69 | 59 | 79 | 68 | 57 |
| f | 125 | 137 | 156 | 112 | 107 | 138 | 123 | 108 |

b) In a partially destroyed Laboratory record, only the lines of regression of y on x and x on y are available as $4x - 5y + 33 = 0$ and $20x - 9y = 107$ respectively. Calculate \bar{x}, \bar{y} and the coefficient of correlation between x and y **(05)**

OR

Obtain Lines of regression for the following data: **(10)**

| | | | | | |
|-------|---|----|----|---|---|
| x_i | 6 | 2 | 10 | 4 | 8 |
| y_i | 9 | 11 | 5 | 8 | 7 |

Find y for $x=6$ and x for $y=8$

Q.6 a) In 256 sets of 12 tosses of a coin, in how many cases one can expect 8 heads and 4 tails. **(05)**

b) A box contains 6 red balls, 4 white balls and 5 blue balls. Three balls are drawn successively from the box. Find the probability that they are drawn in the order red, white, blue if each ball is not replaced. **(05)**

OR

a) A manufacturer of cotter pins know that 3% of his product is defective. If he sells cotter pins in boxes of 100 pins and guarantees that not more than 6 pins will be defective in a box. Find the probability that a box will fail to meet the guaranteed quality. **(05)**

b) In a certain examination test, 2000 students appeared in a subject of statistics. Average marks obtained were 50% with standard deviation 5%. How many students do you expect to obtain more than 60% of marks, supporting that marks are distributed normally. **(05)**

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