

B.Tech. SEM -IV Production 2014 Course (CBCS) : SUMMER - 2019

SUBJECT: ENGINEERING MATHEMATICS-III

Day: Thursday
Date: 23/05/2019

S-2019-2627

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: $(D^3 + 4D)y = \sin 2x$. (05)

b) Solve: $\frac{dx}{3z-4y} = \frac{dy}{4x-2z} = \frac{dz}{2y-3x}$. (05)

OR

a) Solve the differential equations $(D^2 + 4)y = \tan 2x$ by the method of variation of parameters. (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 $\int_0^{\infty} \frac{\cos 6t - \cos 4t}{t} dt$ (05)

b) Find the Laplace transform of the function $\sin(\omega t + \alpha)$. (05)

OR

a) Find the inverse Laplace Transform of the function $\log\left(\frac{s+b}{s+a}\right)$. (05)

b) Using Laplace Transform solve the following differential equation $\frac{d^2y}{dt^2} - 3\frac{dy}{dt} + 2y(t) = 12e^{-2t}$. (05)

Q.3 Solve $\frac{\partial u}{\partial t} = c^2 \frac{\partial^2 u}{\partial x^2}$, subject to conditions. (10)

i) $u(0, t) = 0$,

ii) $u(100, t) = 0$,

iii) $u(x, 0) = x, \quad 0 \leq x \leq 50$
 $\quad \quad \quad = 100 - x, \quad 50 \leq x \leq 100$

iv) $u(x, t)$ is finite $\forall t$

OR

The differential equation of a string is, (10)

$$\frac{\partial^2 u}{\partial t^2} = c^2 \frac{\partial^2 u}{\partial x^2}$$

The given conditions are,

i) $y(0, t) = 0; \quad \forall t$

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

iii) $\left(\frac{\partial y}{\partial t}\right)_{t=0} = 0; \quad \forall x$

iv) $y(x, 0) = 3(lx - x^2); \quad 0 \leq x \leq l$

P.T.O.

- Q.4** The scores obtained by two batsman A and B in 10 matches are given below. Determine who is more consistent and who is better run getter? (10)

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

OR

- a) Calculate standard deviation for the following frequency distribution. Decide whether A.M. is good average. (05)

x	5	15	25	35	45	55
f	5	9	15	12	10	03

- b) Find the first four moments about the working mean 44.5 of a distribution are -0.4, 2.99, -0.08 and 27.63. Calculate the moments about the mean. Also calculate β_1 and β_2 . (05)

- Q.5** a) Find the coefficient of correlation for the following table. (05)

x_i	10	14	18	22	26	30
f_i	18	12	24	6	30	36

- b) The two regression equations of the variables x and y are
 $x = 19.13 - 0.87y$, $y = 11.64 - 0.50x$ (05)
 Find: i) \bar{x}, \bar{y}
 ii) The correlation coefficient between x and y .

OR

Calculate the regression lines of x on y and y on x from the following data and estimate x when $y = 26$ and estimate y when $x = 21$. (10)

y_i	10	12	13	17	18	20	24	30
f_i	5	6	7	9	13	15	20	21

- Q.6** a) Find the probability of getting 4 heads in 6 tosses of fair coin. (05)
 b) 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)

OR

- a) In a sample of 1000 cases, the mean of certain test is 14 and S.D. is 25. Assuming the distribution is normal. Find how many students score between 12 and 15. (05)
 (Given; $A(z=0.08)=0.0319$, $A(z=0.04)=0.0160$)
 b) The number of computer science books borrowed from a Library during a particular week is given below. (05)

Days	Mon	Tues	Wed	Thu	Fri	Sat
Number of books borrowed	140	132	160	148	134	150

Test the hypothesis that the number of books borrowed does not depend on the day of the week

(Taking 5% level of significance, Given; $\chi_{0.05,5} = 11.07$)