B.Tech. SEM -IV Production 2014 Course (CBCS) : WINTER - 2018

SUBJECT: EMGINEERING MATHEMATICS-III

Day: Tuesday **W-2018-2362** Time: 02.30 PM TO 05.30 PM

Date: 13/11/2018 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: $\left(D^2+6D+9\right)y=5^x-\log 2$. **(05)**

b) Solve: $\frac{dx}{y}=\frac{dy}{-x}=\frac{dz}{xe^{x^2+y^2}}$. **(05)**

OR

a) Solve: $x^2\frac{d^2y}{dx^2}+5x\frac{dy}{dx}+3y=\frac{\log x}{x^2}$. **(05)**

b) Solve the differential equation $\left(D^2-6D+9\right)y=\frac{e^{3x}}{x^2}$ by the method of variation of parameters. **(05)**

Q.2 **a)** Using Laplace transform, evaluate $\int_0^\infty e^{-2t}\,t\cos t\,dt$. **(05)**

b) Obtain the Laplace transform of $\frac{1}{2}(sinat + at\cos at)$. **(05)**

OR

a) Using partial fractions, find the inverse Laplace transform of $\frac{4s-5}{s^2-s-2}$. **(05)**

b) Using Laplace Transform solve the following differential equation **(05)**

$\frac{d^2y}{dt^2}+y(t)=t, \quad y(0)=1, \quad y'(0)=-2$.

Q.3 An infinitely long uniform metal plate is enclosed between lines $y=0$ *and* $y=L$ *for* $x>0$. The temperature is zero along the edges $y=0$, $y=L$ and at infinity. If the edge $x=0$ is kept at a constant temperature u_0, find the temperature distribution $u(x,y)$. **(10)**

OR

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

P.T.O.

Q.4 Fluctuation in the aggregate of marks obtained by two groups of students are given below. Find out which of the two shows greater variability. **(10)**

Group A	518	519	530	530	544	542	518	550	527	527	531	550	550	529	528
Group B	825	830	830	819	814	814	844	842	842	826	832	835	835	840	840

OR

Find the four moments about the mean of the following: **(10)**

x	61	64	67	70	73
f	5	18	42	27	8

Also calculate β_1 and β_2

Q.5 Find the lines of regression for the following data: **(10)**

x	10	14	19	26	30	34	39
y	12	16	18	26	29	35	38

And estimate y for $x = 14$ and x for $y = 30$.

OR

a) Calculate the coefficient of correlation between the marks obtained by 8 students in mathematics and statistics from the following table. **(05)**

Marks in Maths (x)	25	30	32	35	37	40	42	45
Marks in stats (y)	8	10	15	17	20	22	24	25

b) If $r = 0.87$, $\Sigma x_i y_i = 90$, $\sigma_x = 4.3$, $\Sigma y_i^2 = 98$. Find the number of item of x and y where x and y are derivation from arithmetic mean. **(05)**

Q.6 **a)** A can hit the target 1 out of 4 times. B can hit the target 2 out 3 times. C can hit the target 3 out of 4 times. Find the probability that at least two hit the target **(05)**

b) The probability that a bomb dropped from a plane will strike the target is $\frac{1}{5}$. If six bombs are dropped find the probability that exactly two will strike the target. **(05)**

OR

a) If the probability that an individual suffers a bad reaction from a certain injection is 0.001, determine the probability that out of 2000 individual, more than 2 individuals, will suffer a bad reaction. **(05)**

b) Among 64 off springs of a certain cross between European horses 34 were red, 10 were black and 20 were white. According to a genetic model, these numbers should be in the ratio 9:3:4. Is the data consistent with the model at 5% level $\left(Given;\ \chi^2_{2;0.05} = 5.991\right)$ **(05)**

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