

Sample Question Paper – I

9018

Course Name :- Mechanical Engineering Group
Course code :- CE/CS/CR/CV/ME/FE/CH
Semester :- Third
Subject :- Applied Mathematics
Duration :- 3 hours

Marks: 80

Instructions: 1) All the questions are compulsory
2) Figures to the right indicate full marks
3) Assume suitable additional data if necessary

Q. 1 Attempt any eight of the following (16)

1) $\int \sec^2 x^0 dx$

2) $\int \frac{dx}{(x+1)(x+2)}$

3) $\int \sqrt{1+\cos 2x} dx$

4) $\int x^2 e^x dx$

5) $\int \frac{dx}{(x+1)(x+2)}$

6) Verify that $y=e^{-x}$ is a solution of $\frac{d^2y}{dx^2} - y = 0$

7) Solve the following differential equation $xdy-ydx=0$

8) A body released from a height of 490m find the time by the body to reach the ground ($g=9.8m/s^2$)

9) A cubic die is thrown 4 times. What is the probability of obtaining at least one six.

10) On a final examination in maths the mean was 72 and the standard deviation was 15. Determine the standard scores of students receiving grades a) 60 b) 93

Q. 2 Attempt any three (12)

a) $\int \frac{dx}{x \log x \log(\log x)}$

b) $\int \frac{dx}{5-4\cos x}$

c) $\int_0^5 \frac{\sqrt{9-x}}{\sqrt{9-x} + \sqrt{x+4}} dx$

d) find area enclosed by the curve $y=4-x^2$ and the lines $x=0, x=2, y=0$

Q.3 Attempt any three

(12)

- a) $\int_0^{\pi/2} \log(\sin x) dx$
- b) find the volume of sphere of radius r
- c) find the MI of a uniform rod of length 2l about an axis through the mid pt perpendicular to it
- d) Find C.G of the area in the first quadrant bounded by the parabola $y^2=4ax$ and the ordinate $x=h$

Q. 4 Attempt any four

(16)

- a) solve the differential equation $(3x^2+6xy^2)dx+(6x^2y+4y^2)dy=0$
- b) Solve the differential equation $(1+x^2)\frac{dy}{dx} + y = e^{\tan^{-1}x}$
- c) Solve the differential equation $(x+y+1)\frac{dy}{dx} = 1$
 - a) Solve by Gauss-elimination method $2x+y+z=10, 3x+2y+3z=18, x+4y+9z=16$
 - b) Solve by jacobi's method $5x-y+z=10$
 $2x+4y=12$
 $x+y+5z = -1$
 - c) Solve the following equation by Gauss-seidal method $10x+y+z=12$
 $x+10y+z=12$
 $x+y+10z=12$

Q. 5 Attempt any four

(12)

- a) The SHM is executed by the particle according to the law $\frac{d^2y}{dx^2} = 3x^2$ if $y=3/4$ when $x=0$ and $y=2$ when $x=1$ find y
- b) The velocity of a particle at time t seconds from the commencement of motion is given by $v=5t-t^2+4$ How much distance does it cover in 3 seconds if it was intially at rest.
- c) find roots of $x^2-\log x-12$ over (3,4)
- d) Evaluate $\sqrt[3]{7}$ using Newton-Raphson method

Q. 6 Attempt any three

(12)

- a) Find the approximate root of $x^3-9x+1=0$ in (2.5,3)
- b) Using Poissons distribution find the probability that the ace of spades will be drawn from a pack of well shuffled cards at least once in 104 consecutive trials
- c) The mean intelligence level of a group of children is go with a standard deviation of 20. Assuming that intelligence level is normally distributed. Find the percentage of children with intelligence level over 100
- d) If 20% of the bolts produce by a machine are defective, determine the probability that out of 4 bolts drawn a) one is defective b) at the most two are defective.