# PRESIDENCY UNIVERSITY
# BENGALURU

## SCHOOL OF ENGINEERING          SET A

### TEST - 1

**Even Semester**: 2018-19                    **Date**: 01 March 2019

**Course Code**: MAT 104                    **Time**: 1 Hour

**Course Name**: Engineering Mathematics -IV          **Max Marks**: 40

**Programme & Sem**: B. Tech & IV Sem          **Weightage**: 20%

## Instructions:
*(i)      Read the question properly and answer accordingly.*
*(ii)     Question paper consists of 3 parts.*
*(iii)    Scientific and Non-programmable calculators are permitted*

## Part A

Answer **all** the Questions. **Each** question carries **four** marks.          (3Qx4M=12)

1. A pair of fair dice is tossed. Find the probability of getting
   a. a total of 8;
   b. at most a total of 5.

2. The probability density function of a continuous random variable X is given by
   $$f(x) = \begin{cases} k(1 - x^2), & 0 < x < 1 \\ 0, & \text{otherwise} \end{cases}$$ . Find (i) k (ii) P (0.1< x < 0.2).

3. The probability that a married man watches a certain television show is 0.4, and the probability that a married woman watches the show is 0.5. The probability that a man watches the show, given that his wife does, is 0.7. Find the probability that (a) a married couple watches the show; (b) a wife watches the show, given that her husband does.

## Part B

Answer **all** the Questions. **Each** question carries **eight** marks.          (2Qx8M=16)

4. In a certain assembly plant, three machines, B1, B2, and B3, make 30%, 45%, and 25%, respectively, of the products. It is known from past experience that 2%, 3%, and 2% of the products made by each machine, respectively, are defective. Now, suppose that a finished product is randomly selected. What is the probability that it is defective? Also if a product was chosen randomly and found to be defective, what is the probability that it was made by machine B3?

5. Fit a straight line of the form y=ax+b for the following data:

| X | 0 | 1 | 3 | 6 | 8 |
|---|---|---|---|---|---|
| Y | 1 | 3 | 2 | 5 | 4 |

## Part C

Answer the Question. Question carries **twelve** marks. (1Qx12M=12)

6. Let X denote the minimum of the two numbers that appear when a pair of dice is thrown once. Then determine the (a) Probability distribution (b) Mean (c) Variance.

# PRESIDENCY UNIVERSITY
## BENGALURU

### SCHOOL OF ENGINEERING                    SET B

### TEST - 1

**Even Semester**: 2018-19

**Course Code**: MAT104

**Course Name**: Engineering Mathematics-IV

**Programme & Sem**: B. Tech & IV Sem

**Date**: 01 March 2019

**Time**: 1 Hour

**Max Marks**: 40

**Weightage**: 20%

## Instructions:
*(i)     Read the question properly and answer accordingly.*
*(ii)    Question paper consists of 3 parts.*
*(iii)   Scientific and Non-programmable calculators are permitted*

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### Part A

Answer **all** the Questions. Each question carries **four** marks.                    (3Qx4M=12)

1.  A die is loaded in such a way that an even number is twice as likely to occur as an odd number. If $E$ is the event that a number less than 4 occurs on a single toss of the die. Find $P(E)$ ?

2.  If the probabilities that an automobile mechanic will service $3, 4, 5, 6, 7$ or $8$ or more cars on any working day are respectively $0.12, 0.19, 0.28, 0.24, 0.10$ and $0.07$. What is the probability that he will service at least 5 cars on his next day at work?

3.  The probability density function $f(x)$ of a continuous random variable is given by
    $f(x) = ce^{-|x|}, \quad -\infty < x < \infty.$ Find value of $c$ ?

### Part B

Answer **all** the Questions. Each question carries **eight** marks.                    (2Qx8M=16)

4.  In a certain region of the country it is known from past experience that the probability of selecting an adult over 40 years of age with cancer is 0.05. If the probability of a doctor diagnosing a person with cancer as having the disease is 0.78 and the probability of diagnosing a person without cancer as having the disease is 0.06.
    a) What is the probability that an adult over 40 yrs of age is diagnosed as having cancer?
    b) What is the probability that a person diagnosed as having cancer actually has the disease?

5.  Fit a straight line $y = a + bx$ for the data

    | X: | 1 | 2 | 3 | 4 | 5 |
    |----|---|---|---|---|---|
    | Y: | 6 | 5 | 4 | 3 | 2 |

### Part C

Answer the Questions. Question carries **twelve** marks.                    (1Qx12M=12)

6.  The Probability density function of a variable X is

    | X    | 0 | 1  | 2  | 3  | 4  | 5   | 6   |
    |------|---|----|----|----|----|-----|-----|
    | P(X) | k | 3k | 5k | 7k | 9k | 11k | 13k |

    (a) Find k (b) Find P(X < 4); P(X ≥ 5) and P(3 < X ≤ 6) (c) What will be the minimum value of the k so that P(X ≤ 2) > 0.3.

# PRESIDENCY UNIVERSITY
# BENGALURU

## SCHOOL OF ENGINEERING

### TEST - 2

**Even Semester**: 2018-19

**Course Code**: MAT 104

**Course Name**: Engineering Mathematics IV

**Program & Sem**: B.Tech & IV Sem

**Date**: 13 April 2019

**Time**: 1 Hour

**Max Marks**: 40

**Weightage**: 20%

## Instructions:

*(i)* *Read the question properly and answer accordingly.*
*(ii)* *Question paper consists of 3 parts.*
*(iii)* Scientific and Non-programmable calculators are permitted

## Part A

Answer **all** the Questions. **Each** question carries **four** marks. (3Qx4M=12)

1. Find the binomial distribution which has mean 2 and variance is $\frac{4}{3}$ ?

2. A hospital switch board receives an average ($\lambda$ or $m$) 4 emergency calls in an hour. Use Poisson distribution to find the probability that (a) there are at most 2 emergency calls in an hour (b) there are exactly 3 emergency calls in an hour?

3. Given X has a normal distribution with $\mu$ = 50 and $\sigma$=10, find the probability that X assumes a value between 45 and 62.?

## Part B

Answer **both** the Questions. **Each** question carries **eight** marks. (2Qx8M=16)

4. The average grade for an exam is 74 and the standard deviation is 7.If 12% of the class is given A grade, and the grade marks are curved to follow a normal distribution, what is the lowest possible A grade mark and the highest B grade mark ?

5. A sample of 400 items is taken from a population whose standard deviation is 10.The mean of sample is 40.Test whether the sample has taken from a population with mean 38 at 5% level of significance?

**PTO**

## Part C

Answer **Any One** Question. Question carries **twelve** marks. (1Qx12M=12)

6. Find correlation coefficient and hence obtain both the lines of regression for the following data:

X: 10   14   18   22   26   30
Y: 18   22   24   26   30   36

**OR**

7.
(a) In a factory producing blades, the probability of any blade being defective is 0.002. If blades are supplied ina packets of 10, determine the number of packets containing (i) no defective (ii) one defective blades in the consignment of 1000 packets?

(b) A multiple choice quiz has 200 questions each with 4 possible answers of which one is correct answer. By Normal approximation to Binomial, what is the probability that sheer guesswork yields from 25 to 30 correct answers for the 80 of the 200 questions about which the student has no knowledge?

# PRESIDENCY UNIVERSITY
## BENGALURU

## SCHOOL OF ENGINEERING

### END TERM FINAL EXAMINATION

**Even Semester**: 2018-19                    **Date**: 20 May 2019

**Course Code**: MAT 104                    **Time**: 3 Hours

**Course Name**: Engineering Mathematics-IV          **Max Marks**: 80

**Program & Sem**: B.Tech & IV Sem          **Weightage**: 40%

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**Instructions:**

   (i)     *Read the question properly and answer accordingly.*
   (ii)    *Question paper consists of 3 parts.*
   (iii)   *Scientific and Non-programmable calculators are permitted.*

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## Part A

Answer **all** the Questions. **Each** question carries **one** mark.            (20Qx1M=20M)

1.

(i)  Accepting $H_0$ when it is wrong is

a) Type I error    b) Type II error       c) one tailed alternatives d) two tailed alternatives

(ii) If O(S)= m, O(A) = n , then Probability of an event A is defined by

a) P (A) = n/m          b) P (A) = m/n          c) P (A) = m/S                d) P (A) = n/S

(iii) If A and $A^{/}$ are complementary events then

a) P (A) P ($A^{/}$) =1    b) P (A) / P ($A^{/}$) =1   c) P (A) + P ($A^{/}$) =1  d) P (A) - P ($A^{/}$) =1

(iv) The probability of getting an even number in tossing a die is

a) 1/3          b) 2/3          c) 3/6          d) 4/3

(v) Any population constant is called

a) Statistic          b) Parameter          c) Estimate          d) Evaluate

(vi) Any calculation on the sampling data is:

a) Statistic          b) Parameter          c) Estimate          d) Evaluate

(vii)      The range of the correlation coefficient is:

a) [-1, 1]        b) [-2, 2]          c) (0, 1)          d) (-1, 0)

(viii)     If equation of the line of regression of y on x is with negative slope then

a) Correlation coefficient is positive          b) correlation coefficient is negative

c) No correlation between x and y          d) none of these

(ix) The expected value of a discrete random variable 'x' is given by

a) P(x)  b) $\sum$ P(x)  c) x $\sum$ P(x)  d) 1

(x) The area to the right as well as to the left of the line Z=0 in standard normal curve is

a) 0.5  b) 0.1  c) 0.05  d) 0.01

(xi) The value of standard normal variate corresponding to x= 20, $\mu$= 12 and $\sigma$ = 4 is

a) 2  b) 3  c) 4  d) 5

(xii)   Area of the standard normal curve between Z= -0.86 and Z=0 is

a) 0.3051  b) 0.2779  c) 0.975  d) 0.6308

(xiii)   The group of individuals under study is called

a) Statistic  b) Parameter  c) sample  d) Population

(xiv)   The order of convergence is faster in

a) Bisection method  b) Regula-Falsi method  c) NR-method  d) None of these

(xv)   The hypothesis which is complimentary to null hypothesis is called

a) Alternative hypothesis  b) Null hypothesis  c) sampling error  d) standard deviation

(xvi)   The probability of drawing a king from a deck of cards is

a) 1/52  b) 4/52  c) 2/52  d)4/56

(xvii)   The value of the constant k, for a continuous probability distribution f(x)= kx (1-x),

Where $0 \le x \le 1$ is

a) 6  b) 3  c) 2  d) 1

(xviii)   A table with all possible value of a random variable and its corresponding

Probabilities is called

a) Probability Mass Function  b) Probability Density Function

c) Cumulative distribution Function  d) Probability Distribution

(xix)   If n=10 and p=0.8, then the mean of the binomial distribution is _____

a) 8  b) 0.2  c) 80  d) 0.88

(xx)   If two dice are tossed simultaneously, the probability that the total is equal to 12 is

a) 1/36  b) 3/36  c) 1/6  d) 3/6

Answer **all** the Questions. **Each** question carries **eight** marks.          (5Qx8M=40M)

**2.** Three machines A, B and C produce 60%, 30%, and 10% of the total production of the factory respectively. The percentages of the defective output of these machines are respectively 2%, 3%, and 4%. If an item is selected at random,

a) What is the probability that it is defective?

b) Find the probability that the defective item was produced by machine C:-

**3.** Using Newton-Raphson method, find the real root of $x \log_{10} x = 1.2$ correct to four decimal places. Consider the initial approximation as 2.

**4.** From the table below, Find the value of y at x= 3.5 using suitable interpolation formula.

| X | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|
| Y | 4.8 | 8.4 | 14.5 | 23.6 | 36.2 | 52.8 | 73.9 |

**5.** Use Simpson's one-third rule to evaluate $\int_0^{0.6} e^{-x^2} dx$ by taking seven ordinates.

**6.** Using Euler's Modified method, Solve $\dfrac{dy}{dx} = \dfrac{y^2 - x^2}{y^2 + x^2}$ with $y(0) = 1$ at x=0.2. Take h=0.2.

## Part C

Answer **both** the Questions. **Each** question carries **ten** marks.          (2Qx10M=20M)

**7. a)** Using Runge-Kutta method of fourth order, obtain the approximate value of y when x=0.2 by taking h=0.1 for $\dfrac{dy}{dx} = x + y$ with $y(0) = 1$.

**(OR)**

**b)** In a test on 2000 electric bulbs, it was found that the life of a particular make, was normally distributed with an average life of 2040 hours and Standard deviation of 60 hours. Estimate the number of bulbs likely to burn for [$\Phi(1.83)=0.4664$, $\Phi(1.5)=0.4332$ & $\Phi(2) = 0.4772$]

(i) More than 2150 hours          (ii) less than 1950 hours and

(iii) Between 1920 hours and 2160 hours.

**8. a)** Fit a second degree parabola to the following data.

| X | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 | 3.5 | 4.0 |
|---|---|---|---|---|---|---|---|
| y | 1.1 | 1.3 | 1.6 | 2.0 | 2.7 | 3.4 | 4.1 |

**(OR)**

**b)** Solve the following equations by Gauss Seidel method. Carry out four iterations

$10x - 2y - 3z = 205$, $-2x + 10y - 2z = 154$, $-2x - y + 10z = 120$.

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## BENGALURU

## SCHOOL OF ENGINEERING

### SUMMER TERM / MAKE UP END TERM EXAMINATION

**Instructions:**
 *(i)      Read the question properly and answer accordingly.*
 *(ii)     Question paper consists of 3 parts.*
 *(iii)    Scientific and Non-programmable calculators are permitted*

## Part A

Answer **all** the Questions. **Each** question carries **eight** marks.          (3Qx8M=24)

1.  Using Newton-Raphson's method, find the approximate root of $3x = \cos x + 1$ near $x_0 = 0.5$.

2.  Using Picard's method, find $y(0.2)$ for the IVP $y' = x + y$, $y(0) = 1$.

3.  Evaluate $\int_0^6 \frac{dx}{1+x^2}$ using trapezoidal rule, by taking 6 equal intervals.

## Part B

Answer **all** the Questions. **Each** question carries **ten** marks.          (3Qx10M=30)

4.  Apply Newton's divided difference formula to find $y'(6)$ for the following data

| x | 0 | 1 | 4 | 5 |
|---|---|---|----|----|
| y | 4 | 3 | 24 | 39 |

5.  Using Taylor series method, find $y(1.02)$ given $y' = xy - 1$, $y(1) = 1$ with $h = 0.02$.

6.  Using Euler's modified method, find $y(0.1)$ given $y' = x^2 + y^2$, $y(0) = 1$.

## Part C

Answer **both** Questions. **Each** question carries **thirteen** marks.          (2Qx13M=26)

7.  Evaluate $\int_4^{5.2} \log_e x \, dx$ using Simpson's 1/3$^{rd}$ rule and Simpson's 3/8$^{th}$ rule, by taking 6 equal intervals.

8.  Apply Runge – Kutta method to find the value of $y$ at $x = 0.2$, given $\frac{dy}{dx} = \frac{y-x}{y+x}$, $y(0) = 1$ with $h = 0.2$.