Code No. 2919/AICTE/M

FACULTY OF ENGINEERING

B.E. (Civil) (AICTE) IV-Semester (Main) Examination, December 2020

Subject : Mathematics – III (PDE, P & S)

Time : 2 Hours **Max. Marks: 70**

***Note:** (Missing data if, any can be assumed suitable).*

PART – A

Answer any five questions. **(5 x 2 = 10 Marks)**

1 Form the partial differential equation by eliminating arbitrary function from $z = f(x^2 - y^2)$.

2 Solve $P(1+q) = qz$.

3 Using method of separation of variables, solve $\frac{\partial u}{\partial x} = 4\frac{\partial u}{\partial y}$, given that $u(0, y) = 8e^{-3y}$.

4 Define one dimensional and two dimensional heat equations.

5 Define uniform distribution and hence find its mean.

6 Find the moment generating function of the Poisson distribution.

7 The rankings of the ten students in two subjects A and B are as follows:

A	3	5	8	4	7	10	2	1	6	9
B	6	4	9	8	1	2	3	10	5	7

Find the correlation coefficient.

8 Prove that correlation coefficient is independent of change of origin and scale.

9 A die is thrown 60 times with the following results.

Face	1	2	3	4	5	6
Frequency	8	7	12	8	14	11

Test at 5% level of significance if the die is honest, assuming that $P(\chi^2 > 11.1)=0.05$ with 5 degrees of freedom.

10 A random sample of 10 boys has the following IQ:
70, 120, 110, 101, 88, 83, 95, 98, 107, 100
Do these data support the assumption of a population mean IQ of 100 (at 5% level of significance).

PART – B

Answer any four questions. **(4 x 15 = 60 Marks)**

11 (a) Solve $(z - y)p + (x - z)q = y - x$.
(b) Solve $p\,x\,y + pq + qy = yz$.

12 (a) Solve the equation with boundary conditions $u(x,0)=3\sin n\pi x$, $u(0, t) = 0$ and $u(1, t) = 0$ where $0 < x < 1$, $t > 0$.
(b) Find the deflection of a vibrating string of unit length having fixed ends with initial velocity zero and initial deflection $f(x)=K(\sin x - \sin 2x)$.

13 Find the moments about mean of normal distribution. What can you conclude about odd and even order moments about the mean of $N(\mu, \sigma^2)$.

14 (a) The means of simple samples of sizes 1000 and 2000 are 67.5 and 68.0 cm respectively. Can the samples be regarded as drawn from the same population of S.D. 2.5cm?

(b) Fit the curve $y = ae^{bx}$ to the following data:

x	0	2	4
y	5.1	10	31.1

15 (a) Two independent samples of sizes 7 and 6 have the following values:

Sample A	28	30	32	33	33	29	34
Sample B	29	30	30	24	27	29	

Examine whether the samples have been drawn from normal population having same variances? [F at 5% level for (6, 5) d.f. is for (5, 6) d.f. is 4.39]

(b) Sample two types of electric light bulbs were tested for length of life and following data were obtained:

	Type 1	Type 2
Sample No.	n_1=8	n_2=7
Sample means	$\bar{x}_1$=1,234 hrs	$\bar{x}_2$=1,036 hrs
Sample S.D.'s	s_1=36 hrs	s_2=40 hrs

Is the difference in means sufficient to warrant that type 1 is superior to type 2 regarding length of life?

16 (a) Prove that coefficients of regressions are independent of the change of origin but not of scale.

(b) In a distribution exactly normal, 7% of the items are under 35 and 89% are under 63. What are the mean and standard deviation of the distribution?

17 Solve the differential equation $\frac{\partial u}{\partial t} = \alpha^2 \frac{\partial^2 u}{\partial x^2}$ for the condition of heat along a rod without radiation, subject to the following conditions:

(a) u is not infinite for $t \to \infty$

(b) $\frac{\partial u}{\partial x}$ = 0 for x = 0 and $x = l$

(c) $u = lx - x^2$ for t = 0, between x = 0 and $x = l$

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Code No. 2965/AICTE/M

FACULTY OF ENGINEERING

B.E. (CSE/EEE/Inst.) (AICTE) IV-Semester (Main) Examination, December 2020

Subject : Mathematics – III (P & S)

Time : 2 Hours **Max. Marks: 70**

***Note:** (Missing data if, any can be assumed suitable).*

PART – A

Answer any five questions. **(5 x 2 = 10 Marks)**

1 Define conditional probability.

2 A continuous random variate X has the probability density function
$f(x) = a + bx$, $0 \le x \le 1$
$= 0$, elsewhere of the distribution is $\frac{1}{3}$, find the values of a and b.

3 Define Binomial distribution.

4 Define Skewness.

5 Find the mean of Exponential distribution.

6 Explain Normal distribution.

7 Write normal equations of straight line.

8 Write the equations of the regression lines.

9 Define Null hypothesis.

10 Define Population and sample.

PART – B

Answer any four questions. **(4 x 15 = 60 Marks)**

11 (a) State and prove theorem of total probability.
(b) If A and B are two mutually exclusive events of a random experiment, then P(A U B) = P(A) + P(B).

12 (a) If the probability of a bad reaction from a certain injection is 0.001, determine the chance that out to 2,000 individuals more than 2 will get bad reaction.
(b) Calculate the quartile coefficient of skewness from the following data.

Weight (lbs)	70-80	80-90	90-100	100-110	110-120	120-130	130-140	140-150
No. of persons	12	18	35	42	50	45	20	8

13 (a) A continuous random variable X has probability density function
$f(x) = \frac{3}{4}(x^2 + 1),\ 0 \le x \le 1$. Find 'a' such that $P(X \le a) = P(X > a)$.
(b) A continuous random variable X is uniformly distributed with mean 1 and variance 3. Find $P(X < 0)$.

14 (a) A coin was tossed 400 times and head turned up 216 times. Test the hypothesis that the coin is unbiased at 5% level of significance.
(b) Fit a parabola $y = a + bx + cx^2$ for the following data:

x	1	2	3	4	5	6
f(x)	1000	800	500	300	150	90

15 (a) Five dice were thrown 96 times and the no. of times 4, 5 or 6 were thrown were:

No. of dice showing 4, 5, or 6	5	4	3	2	1	0
Frequency	8	18	35	24	10	1

Find the probability of getting this result by chance.

(b) A normal population has mean 0. 1 and a S.D. of 2.1. Find the probability that mean of simple sample of 900 members will be negative?

16 (a) The probability density function of variate X is

X	0	1	2	3	4	5	6
P(X)	K	3K	5K	7K	9K	11K	13K

Find $P(X < 4)$, $P(X \geq 5)$, $P(3 < X \leq 6)$

(b) If X is a Poisson variate such that $P(X = 2) = 3P(X = 4) + 45P(X = 6)$. Find the mean and variance of X.

17 (a) Find the moment generating function of uniform distribution.

(b) Find the correlation coefficient and regression lines for the following data:

x	1	2	3	4	5
y	2	5	3	8	7

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Code No. 2931/AICTE/M

FACULTY OF ENGINEERING

B. E. (ECE/M/P/AE/I.T) IV – Semester (AICTE) (Main) Examination,

December 2020

Subject: Biology for Engineers

Time: 2 hours **Max. Marks: 70**

Note: *(***Missing data if, any can be assumed suitable).**

PART – A

Answer any five questions. **(5 x 2 = 10 Marks)**

1. What is Cell Theory?
2. What are the functions of lipids?
3. Explain briefly about plant growth.
4. Describe briefly about respiration.
5. State the significance of meiosis.
6. Give a brief account of Central dogma.
7. Write a short note on AIDS.
8. How can we prevent hypertension?
9. What are recombinant vaccines?
10. Explain about bioremediation.

PART – B

Answer any four questions. **(4 x 15 = 60 Marks)**

11. (a) Describe the structure of prokaryotic cell.
    (b) Discuss about general characters, classification and functions of carbohydrates.
12. (a) Explain about photosynthesis and its significance in plants.
    (b) Describe about the circulatory systems and functions in animals.
13. (a) Describe the Mendel laws of inheritance.
    (b) Provide the evidence to prove DNA as genetic material.
14. (a) Discuss the causes, diagnosis and treatment of diabetes.
    (b) Give an account on acquired immunity.
15. (a) How are transgenic plants useful in biopharming? Discuss with examples and applications.
    (b) Discuss the production of bioenergy.
16. (a) Give an account on general features and types of microbes.
    (b) Write a note on economic importance of microorganisms.
17. (a) What are biomaterials? Discuss with examples and applications.
    (b) Discuss about biomedical instrumentation and its applications.

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