AJAY KUMAR GARG ENGINEERING COLLEGE, GHAZIABAD

Department of Applied Sciences and Humanities

Pre-University Test

Course: B. Tech.
Session: 2025-26

Semester: IV
Section: ECE-1,2,3, IT-1,2,3, CSIT-1,2, EN, ME

Subject: Mathematics-IV
Max Marks: 70

Sub. Code: BAS 303
Time: 3 hrs.

OBE Remarks:

Q.No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
CO No.	1	1	2	3	3	4	5	1	1	2	2	3	3	4	4	5	5
Bloom's Level	L3	L5	L3	L1	L3	L2	L2	L4	L3	L1	L5	L5	L3	L3	L5	L5	L3
Weightage CO3: 16					**Weightage CO4: 16**										**Weightage CO5: 16**		

Note: Answer **all** the sections.

Section-A

A. Attempt **all** the parts. **(7 X 2 =14)**

1. Form the PDE if $az + b = a^2x + y$
2. Solve the PDE $D\,D'(D - 2D' - 3)\ z = 0$
3. Classify the PDE $x\,u_{xx} + y\,u_{xy} + u_{yy} = 0$
4. Define Kurtosis. If first four central moments of distributions are 0, 60, -50 and 8020 then Test the kurtosis
5. Write the normal equations of $xy = b + ax$.
6. If $f(x) = ce^{-x}, 0 \le x \le \infty$, find the value of c for which f(x) is a Probability Density Function.
7. Define statistical quality control and write two advantages of it.

Section-B

B. Attempt Any three.(Q. No. 12 is Compulsory) **(3X 7=21)**

8. Solve the PDE $px + qy = pq$
9. Solve the PDE $(y + zx)p - (x + yz)q = x^2 - y^2$
10. Find the temperature in a bar of length 2 whose ends are kept at zero and lateral surface insulated if the initial temperature is $\sin\frac{\pi x}{2} + 3\sin\frac{5\pi x}{2}$.
11. A tightly stretched string with fixed end points $x=0$ *and* $x=l$ is initially in a position given by $y = y_0 \sin^3\frac{\pi x}{l}$. If it is released from rest from this position, find the displacement $y(x,t)$.
12. By method of least square fit a curve of the form $y = ab^x$ for the following data:

x	2	3	4	5	6
y	8.3	15.4	33.1	65.2	127.4

Section-C

C. Attempt **all** the parts. **(5 X 7 = 35)**

13. Attempt any one.

a) Calculate Kurtosis for following distribution of height of 100 students:

Height (cm)	59	61	63	65	67	69	71	73	75
No. of Students	0	2	6	20	40	20	8	2	2

b) For a bivariate distribution the following results were obtained: variance of y is 9 and LORs are 8x-10y +66= 0 and 40x – 18y -214=0.
(i) Find mean values of x and y. (ii) Find standard deviation of x. (iii) Find correlation coefficient r_{xy}.

14. Attempt any one.

a) A die is tossed thrice, A success is getting 1 or 6 on a toss. Find mean and variance of the number of successes.

b) A sample of 100 dry battery cells tested to find length of life produced the following data: $\bar{x}$=12 hrs, $\sigma = 3\,hrs$, assuming the data to be normally distributed, what percentage of battery cells are expected to have life (i) more than 15 hrs, (ii) less than 6 hrs, (iii) between 10 to 14 hrs.

15. Attempt anyone.

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 individuals (i) exactly 3 (b) more than 2 (iii) None will suffer a bad reaction.

b) Find mean and variance Poisson distribution.

16. Attempt anyone.

a) The 9 items of a sample have the following values: 45,47,50,52,48,47,49,53,51. Does the mean of these values differ significantly from the assumed mean 47.5?

b) The average income of persons was Rs. 210 and a S.D. of Rs. 10 in a sample of 100 people of city. For another sample of 150 people, the average income was Rs. 220 and S.D. of Rs. 12. The S.D. of income of people of city was Rs. 11. Examine whether average incomes of two samples differ significantly.

17. Attempt anyone.

a) By Chi square test, find whether there is any association between income level and type of schooling:

Income /school	Public school	Govt. school
Low	200	400
High	1000	400

b) A data of 10 samples of size 1000 each, revealed the number of defective units 9, 10,12, 8, 7, 15,10, 12, 10, 8. Calculate control limits for number of defective and state whether the process is under control or not.

Faculty Sign

HoD Sign