TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2075 Chaitra

Exam.	Regular / Back		
Level	BE	Full Marks	80
Programme	BEL, BEX, BCT, BAG	Pass Marks	32
Year / Part	III / I	Time	3 hrs.

Subject: - Probability and Statistics *(SH 602)*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt **All** questions.*
- ✓ *The figures in the margin indicate **Full Marks**.*
- ✓ ***Necessary tables are attached herewith.***
- ✓ *Assume suitable data if necessary.*

1. Write down the significance of statistics in engineering. An experiment shows the height of 51 plants given below. If average heights of all the 51 plants are 40 cm find the missing frequencies corresponding to the height 30 and 50cm. [6]

Height (cm)	10	20	30	40	50	60
No. of plant	2	3	-	21	-	5

2. What do you mean by mutually exclusive, exhaustive and complementary events? Explain with examples. In a particular city, airport A handles 50% of all airlines traffic, airport B handles 30% and airport C handles 20%. The detection rates for weapons at the three airports are 0.9, 0.5 and 0.4 respectively. A passenger is randomly selected at one of the airports. Then (i) what is the probability that he/she carrying a weapon? (ii) If he/she is found to be carrying a weapon, what is the probability that airport A is being used? [5]

3. Define probability density function? A continuous probability distribution of a variable x is defined as $f(x)=KX(1-X)$ for all $0 \le X \le 1$. Compute (i) $P(X \ge 0.4)$ (ii) $P(¼ \le X \le ¾)$ [5]

   Or,

   A fair dice was rolled until one gets a Six; find the expected number of toss required?

4. Define Negative Binomial distribution and explain characteristics. How does it differ from binomial distribution? [6]

5. A typist made 2.6 mistakes per page on average, find the probability that in the page typed by him, i) there is no mistake ii) at least two mistakes iii) at most 3 mistakes. [5]

6. Define Gamma distribution, chief characteristics and write its applications. [5]

   Or,

   The breakdown voltage X of randomly chosen diode of a particular type is known to be normally distributed with mean 40 and s.d. 1.5 volts. What is the probability that the breakdown voltage will be (a) between 39 and 42 volts; (b) at most 43 volts; (c) at least 39 volts.

7. Define estimation? Write characteristics of a good estimator? A sample of 400 students taking Entrance for BE revealed an average score of 56. Construct a 95% as well as 99% confidence interval for population mean score if standard deviation of score of all students in known to be10. [6]

8. A whole sale dealer wanted to buy a large quantity of light bulbs from two brands label A and B. He bought 100 bulbs from each bulbs brand and found by testing that brand A had mean life time 1120 hours and standard deviation 75 hours and brand B had mean life

time 1062 hours and standard deviation 82 hours. Find the 95% and 99% confidence limits for the difference in the average life of bulbs from the two brands. [5]

9. The following are the breaking strength of three different brands of cables.

Brand	Breaking Strength					
A	40	30	50	60	30	-
B	60	40	55	65	-	-
C	60	50	70	65	75	40

Construct ANOVA table and test for the equality of the average breaking strength of cables at α=5%. [5]

10. In a recent survey 1,072 Engineers were classified according to their intelligence (GPA in Bachelor) and economic conditions after graduation. Test whether there is any association between intelligence and economic condition. [6]

Economic Condition after graduation	Intelligence in BE			
	Excellent	Good	Mediocre	Dull
Good	48	199	181	82
Not good	81	185	190	106

x^2 value for 2 d.f.=5.991

11. What is testing of hypothesis? Explain the procedure followed in testing of Significance difference between two population proportion large sample? [5]

12. A simple random sample of Household with TV set in use. Show that 1024 of them were tuned to 60 minute while 3836 were tuned to some other show. Use 0.05 significant level to test the claim of CBS executive that "60 minute get more than a 20 shave", which mean that more than 20% of set in use are tuned to 60 minute. [5]

13. A sample of 10 values of three variables X1, X2 and X3 were obtained as

$\Sigma X_1=10$	$\Sigma X_2=20$	$\Sigma X_3=30$
$\Sigma X_1^2=20$	$\Sigma X_2^2=68$	$\Sigma X_3^2=170$
$\Sigma X_1X_2=10$	$\Sigma X_1X_3=15$	$\Sigma X_2X_3=64$

Find (i) Partial correlation between X_1 and X_2 eliminating the effect of X_3 (ii) Multiple correlation between X_1, X_2 and X_3 assuming X_1 as dependent variable. [5]

14. Differentiate between correlation and regression? From following data find the Karl Pearsons coefficient correlation and interpret the result? [5]

Marks in Statistics	39	65	62	90	82	75	25	98	36	78
Marks in Mathematics	47	53	58	86	62	68	60	91	51	84

15. Following data reveals the sample of 22 pairs of observation (X,Y) drawn from large population.

X	46	61	56	68	58	45	50	59	45	66	57
Y	49	46	43	32	26	27	29	47	37	30	43
X	59	66	62	57	57	45	50	61	55	47	51
Y	32	27	37	24	43	49	48	29	37	32	26

i) Find the sample mean for each variable X and Y.
ii) Which series is more consistent and why?
iii) Find the standard error of the difference of mean.
iv) Find the coefficient of Karl Pearson correlation. [6]

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