TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2076 Chaitra

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

Subject: - Probability and Statistics *(SH602)*

- ✓ 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. A professor of statistics, in his class with 20 students, had conducted a survey about time spent by students on social media, during college hours, and found average time of 20 minutes and standard deviation of 5 minutes. In subsequent verification, it was found that observation 30 was entered as 13. Then find corrected mean and standard deviation of time spent by the students on social media during college hours. [6]
2. Define mutually exclusive and independent events: An insurance company insured 2000 Civil engineers, 4000 Electrical engineers and 6000 Mechanical engineers. The probability of an accident involving Civil engineer, Electrical engineer and Mechanical engineer during their jobs is 0.01, 0.03 and 0.15 respectively. One of the insured engineers meets with an accident. What is the probability that he is civil Engineer? [6]
3. What are the characteristics of Binomial Distribution and how does it differ from Hypergeometric Distribution? [5]
4. 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
   a) Exactly 3, individuals will suffer bad reaction
   b) More than 2, individuals will suffer bad reaction [5]
5. If inner diameter of a rod follow Normal Distribution. If 7% of the rod has inner diameter less than 35 mm and 89% of rod has inner diameter fewer than 63 mm. Find the mean and the standard deviation of diameter of rods. [5]
6. Find the mean and variance of the probability density function given by

$$f(x)=\begin{cases}12x^2(1-x); & 0\le x\le 1\\ 0\ ; & \text{otherwise}\end{cases}$$ [5]

7. Define Standard error and explain its importance in inferential statistics and write down the formula of standard error of sample mean and sample proportion. [5]
8. A population consists of live numbers 4, 8, 12, 16 and 20. If a random sample of size 2 is drawn without replacement. [5]
   a) Find the population mean and population standard deviation.
   b) List the all possible sample and find their sample mean.
   c) Show the mean of sample mean is equal to the population mean.
   d) Find the standard error of sample mean.
9. Write the process of test of significance of difference of two means for large samples. [5]
10. The sales figure of an item in six shops before and after and advertisement is given as:

Before	53	28	31	48	50	52
After	58	29	30	55	56	45

Test whether the advertisement was effective at 5% level of significance? [5]
(t-value for 5 degree of freedom = 2.571)

11. Dyson Company in Berlin plans to produce a new hair product known as Dyson Supersonic. The suppliers for the company are company A and Company B found that 1% and 2% defective of 200 and 300 items respectively. Arrange appropriate hypothesis testing to investigate whether Company B is better by using a 0.05 level of significance. [5]

12. In a recent survey 1650 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. [χ^2 value for 9 degree of freedom=16.919] [5]

Economic Condition after graduation	Intelligence in BE			
	Excellent	Good	Mediocre	Dull
Good	48	199	181	82
Average	80	73	65	89
Below average	86	51	51	84
Not good	81	185	190	105

13. What are the two regression coefficients and what do they present? Write the properties of regression coefficients. [5]

14. Listed below are circumference (in feet) and height (in feet) of trees in Marshall. Minnesota (base on data from "Tree Measurement" by Stenley Rice, American Biology Teacher Vol 61. No 9) [5]

X(circ)	1.8	1.9	1.8	2.4	5.1	3.1	5.5	5.1	8.3
Y (ht)	21.0	33.5	24.6	40.7	73.2	24.4	40.4	45.3	53.5

a) Is there a correlation exist?
b) Explain this correlation.

15. The scores of randomly selected 32 students of two groups on Probability and Statistics are;

Group ' A'				Group 'B'			
50	37	13	37	56	74	50	43
45	9	11	34	39	24	55	35
24	6	13	24	72	32	45	59
32	32	24	40	47	36	34	32
33	45	37	38	40	53	55	18
33	32	46	32	32	42	49	32
46	21	32	4	41	33	14	60
45	16	43	32	60	34	38	48

a) Which group is best?
b) Which group is more consistent?
c) Find standard error of difference of their means. [3+3+2]

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