0.3 kg. The machine is currently set to cut the block of wt. 12kg. A sample of 9 blocks is found to have an average block of wt. 12.25 kg. Set- up the null hypothesis and determine whether it is a one tailed or two tailed test. Use the critical value approach to determine whether the cutting machine needs to be recalibrated?

a) A study reported in the article "The Effects of Water Vapour Concentrations on the Rate of Combustion of an Artificial in Humid Air Flow" (Combustion and Flame) give data on 8

x = temperature of nitrogen oxygen mixture(1000 degree F) under the specified conditions

y = oxygen diffusivity.

Summary quantities are:

$n = 9$,

$\sum x = 12.6$

$\sum y = 27.68$

$\sum x^2 = 18.24$

$\sum y^2 = 93.344$

$\sum xy = 40.968$.

i. Calculate correlation coefficient between x and y, and interpret you answer

ii. Fit a regression equation of y on x.

iii. Find coefficient of determination and interpret it

b) ABC Physical Fitness claims that completion of their weight loss programme will result in a weight loss. To test this claim, SIX persons were selected of random and they were put through the weight loss programme and weights before and after the programme recorded. Test the claim of fitness center at α=0.05. The weights in pounds in six persons recorded before and after the programme are as follows. 7

Person	1	2	3	4	5	6
Weight (before)	145	200	160	185	164	175
Weight (after)	143	190	165	183	160	176

Write short notes on: (Any two) 2×5

a) Criteria of good estimator

b) Error in hypothesis testing

c) Application of Probability and statistics in engineering

105

POKHARA UNIVERSITY

Level: Bachelor Semester: Spring Year : 2015

Programme: BE Full Marks: 100

Course: Probability and Statistics Pass Marks: 45

Time : 3hrs.

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Attempt all the questions.

1. a) The following table shows length of eighty bally bridge : 8

68	84	73	82	68	90	62	88	76	93
73	79	75	73	60	93	71	59	85	75
61	65	88	87	74	62	95	78	63	72
66	78	75	75	94	77	69	74	68	60
96	78	82	61	75	95	60	79	83	71
79	62	89	97	78	85	76	65	71	75
65	80	67	57	88	78	62	76	53	74
86	67	73	81	72	63	76	75	85	77

With the reference of above table.

i. Construct the grouped frequency distribution having class width 10.

ii. Draw less than ogive and more than ogive in same graph and hence locate median.

iii. By the help of less than ogive find the number of bridge having length less than 65 meter.

b) The lives of two models (A and B) of refrigerators in a recent survey are shown below: 7

Life (No. of Years)	No. of refrigerators	
	Model A	Model B
0-2	5	2
2-4	16	7
4-6	13	12
6-8	7	19
8-10	5	9
10-12	4	1

i. What is the average life of each model of these refrigerators?
ii. Which model has greater uniformity?

a) Two production plants, A and B, make wire cables that are sent to a common distributor. 40% of the cables sent to the distributor come from Plant A, and the remaining 60% from Plant B. Among the cables produced at Plant A, 95% meet the strength specifications; among the cables produced at Plant B, 98% meet the strength specification. 8

i. The distributor selects one cable at random from among all cables in stock. If the cable selected is found to meet the strength specifications, what is the probability that the cable was produced at Plant A?
ii. Let A be the event that a cable is manufactured at Plant A; similarly, B be the event that a cable is manufactured at Plant B. Let Y be the event that a cable meets the strength specifications; and let N be the event that a cable does not meet the strength specifications. (i) Are events A and Y independent? Give reasons.

b) The HAL Corporation wishes to improve the resistance of its personal computer to disk driver and key board failures. At present, the design of computer is such that disk-drive failures occurs only one third as often as keyboard failures. The probability of simultaneous disk-drive and key board failures is 0.05. 7

i. If the computer is 80% resistant to disk-drive and/or keyboard failure, how low must the disk-drive failure.
ii. If the keyboard is improved so that it fails only twice as often as the disk-drive(and the simultaneous failure probability is still 0.05), Will the disk drive failure probability from part (I) yield a resistance to disk-drive and /or keyboard failure higher or lower than 90%.

a) On the average how many time must a dice thrown until one get a 6? 5

b) Harley Davidson, director of quality control for the Kyoto Motor company, is conducting his monthly spot check of automatic transmission. In this procedure, 10 transmissions are removed from the pool of components and are checked for manufacturing defects. Historically, only 2% of the transmissions have such flaws. (Assume that flaws occur independently in different transmission) 5

i. What is the probability that Harley's sample contains more than two transmissions with manufacturing flaws?
ii. What is the probability that none of the selected transmission has any manufacturing flaws?

c) Busses arrive at a specified stop at 15-minute intervals starting at 7A.M. That is, they arrive at 7, 7:15, 7:30, 7:45, and so on. If a passenger arrives at the stop at a time that is uniformly distributed between 7 and 7:30, find the probability that he waits. 5

i. Less than 5 minutes for a bus
ii. At least 12 minutes for a bus

4. a) Unisys.com is one of the most frequented business to business websites; assume that the length of a visit on the Unisys websites is distributed as a normal random variable with a mean of 65.7 minutes and a standard deviation of 15 minutes. 7

i. What is the probability that a randomly selected visit will last more than 90 minutes?
ii. Only 20% of the visits will last less than how many minutes?

b) $f(x,y) = 4xy, \quad 0<x<1, \ 0<y<1$
$= 0 \quad$ otherwise 8

i. Verify that $f(x,y)$ is a p.d.f.
ii. Find the marginal probability density function of X and Y.
iii. Find whether X and Y are independent or not.

5. a) In a certain factory there are two independent processes manufacturing the same item. The average weight in a sample of 250 items produced from one process is found to be 120grams with standard deviation of 12 grams, while the corresponding figures in a sample of 400 items from the other process are 124 and 14. Test whether two mean weights differ significantly or not at 10% level of significance. 5

b) From a population of 540, a sample of 60 individuals is taken. From this sample, the mean is found to be 6.2 and standard deviation 1.368. 5

i. Find the estimated standard error of the mean.
ii. Construct 96% confidence interval for mean.

c) A machine is used to cut wheels of cheese into blocks of specified weight. On the basis of long experience it has been observed that the wt. of the blocks is normally distributed with a standard deviation of 5