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OFFICE OF THE DEPUTY PRINCIPAL
ACADEMICS, STUDENT AFFAIRS AND RESEARCH

UNIVERSITY EXAMINATIONS

2019 /2020 ACADEMIC YEAR

SECOND YEAR SECOND SEMESTER REGULAR EXAMINATION

FOR THE DEGREE OF BACHELOR OF SCIENCE (COMPUTER SCIENCE)

COURSE CODE: **STA 205**

COURSE TITLE: **STATISTICS AND PROBABILITY**

DATE: 28TH OCTOBER, 2020 **TIME: 0900 – 1200 HRS**

INSTRUCTION TO CANDIDATES

- **SEE INSIDE**

THIS PAPER CONSISTS OF 4 PRINTED PAGES **PLEASE TURN OVER**

REGULAR – MAIN EXAM

STA 205: STATISTICS AND PROBABILITY

STREAM: COMP **DURATION: 3 Hours**

INSTRUCTION TO CANDIDATES

Answer **ALL** questions from section A and **ANY THREE** Questions in section B.
All questions in section B carry Equal Marks

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SECTION A (31 marks): Answer ALL questions.

QUESTION ONE (16MARKS)

a) A biased coin is tossed six times. The probability of a head turning up on any toss is 0.3. Let X denote the number of heads that come up.
Calculate:
i) $P(X=2)$ [3mks]
ii) $P(X=3)$ [2mks]
iii) $P(1 < X < 5)$ [2mks]

b) Consider a computer system with poison job-arrival stream at an average of 2 per minute. Determine the probability that in any one-minute interval there will be:
i) 0 jobs [3mks]
ii) Exactly 2 jobs [2mks]
iii) At most three arrivals [2mks]
iv) More than 3 arrivals [2mks]

QUESTION TWO (15MARKS)

a) State and explain the steps in testing of statistical hypothesis [7mks]

b) Suppose we wanted to test whether or not the average STA 205 (Computer Science group) score was significantly different from the average (Engineering group) score at a certain University. Taking a random sample, we manage to get the following 7 scores from Computer Science students and 9 scores from Engineering students:

COM	34	50	43	40	38	47	29		
ENG	54	48	39	45	44	35	52	40	60

Assuming that the variance in STA 205 scores for students for COM group and students for ENG group are the same =9, and assuming that both samples are taken from normal populations, test (at the $\alpha = 0.05$ significance level) whether or not there is a significant difference in the average STA 205 score between these two groups. [8mks]

SECTION B (39 MARKS)

Answer any THREE questions. All Questions carry equal marks

QUESTION THREE (13 MARKS)

a) Occasionally, a random sample of five jars of Tinker Belle Peanut Butter is selected from the output and weighed, to be sure that the system is under control. Here are data on ten such samples. Measurements are in kilograms.

	Sample	1	2	3	4	5	6	7	8	9	10
		.50	.50	.50	.51	.51	.51	.50	.50	.51	.50
		.47	.48	.49	.51	.50	.50	.51	.52	.48	.51
		.50	.48	.51	.52	.49	.52	.49	.47	.50	.49
		.49	.48	.47	.51	.52	.51	.50	.49	.49	.50
		.51	.47	.49	.51	.50	.51	.48	.49	.50	.47
	Total	2.47	2.41	2.46	2.56	2.52	2.55	2.48	2.47	2.48	2.47

i. What type of control chart should be used here? Why? (1mk)
ii. What is the centerline of the chart? (1mk)
iii. What is the lower control limit? The upper control limit? (1mk)
iv. What statistic should be plotted on the control chart for each sample? (1mk)
v. Draw the control chart on a piece of graph paper. (1mk)

b) Explain how sample bias can be eliminated in a survey study (2mks)
c) Explain the difference between stratified sampling and multi stage sampling (2mks)
d) State the factors to consider in choosing a sampling frame (2mks)
e) State and explain the steps in sampling process (2mks)

QUESTION FOUR (13 MARKS)

The following table shows the ages and blood pressure of 8 persons

Age (x)	52	63	45	36	72	65	47	25
B. P (Y)	62	53	51	25	79	43	60	33

a) Obtain the regression equation model of Y on X [10mks]
b) Find the expected blood pressure of a person aged 49 years old. [3mks]

QUESTION FIVE (13 MARKS)

a) Give the assumptions of F-test [4mks]

b) The following data gives the yields on 12 plots of land in three samples, each of 4 plots, under three varieties of fertilizers A,B, and C

A	B	C
25	20	24
22	17	26
24	16	30
21	19	20

Use Analysis of Variance (ANOVA) technique to test if there is any significant difference in the average yields of Land under the three varieties of fertilizers? [9mks]

QUESTION SIX (13 MARKS)

Out of 800 persons, 25% were literate and 300 had travelled beyond the limits of their district. 40% of the literates were among those who had not travelled.

Required:

a) Prepare a 2x2 contingency table for the data [3mks]

b) State the Null and Alternative hypothesis and test at 5% level of significance Whether there is any relation between travelling and literacy

[Given $\chi^2 = 3.84$ at d.f=1, α=0.05] [10mks]

QUESTION SEVEN (13 MARKS)

a) Differentiate between type I error and type II error [4mks]

b))Two critics were asked to rank in order of preference 10 television series

Tvs series	A	B	C	D	E	F	G	H	I	J
Critics 1	4	3	6	9	2	1	7	10	8	5
Critic 2	7	1	3	8	2	6	5	10	9	4

Are the views of the two critics consistent [9mks]

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