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SLIATE

SRI LANKA INSTITUTE OF ADVANCED TECHNOLOGICAL EDUCATION

(Established in the Ministry of Higher Education, vide in Act No. 29 of 1995)

Higher National Diploma in Technology (Agriculture)

First Year, Second Semester Examination - 2016

CC 1202 – Basic Mathematics and Statistics

Instructions for Candidates:
There are three parts (I,II & III)
All questions do not carry equal marks.
Answer part I and part II on the paper itself, and will be collected after one (01) hour.
Two (02) hours for Part III.
Calculators are allowed.
Statistical table will be provided.

No. of questions : 07
No. of pages : 08
Time: Three (03) hours

PART – I

Question 01. (Total 16 marks)

Select the correct answer and underline it.

(i) Given the Universal set, U = {1,2,3,4,5,6,7,8,9,10}
A= {1,3,5,7,9}
B = { 2,3,5,7}
C = {2,4,6,8,10}

Find, $A \cup B \cup C$ is

a) {3,5,7}
b) {1,2,3,4,6,8,10}
c) {1,2,3,4,5,6,7,8,9,10}
d) {2,4,6,8,10}

(ii) The complement of the set B, (B') in above question is,

a) {3,5,7}
b) {1,3,5,7,9}
c) {2,4,6,8,10}
d) {1,4,6,8,9,10}

(iii) Identify Matrix A, B and C respectively

$A = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ $B = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ $C = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$

a) Square matrix, Diagonal matrix, Zero matrix
b) Identity matrix, Diagonal matrix, Zero matrix
c) Identity matrix, Square matrix, Zero matrix
d) Square matrix, Diagonal matrix, Zero matrix

(iv) For the following matrix A , find 2A,

$A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$

a) $2A = \begin{bmatrix} 2 & 6 \\ 4 & 8 \end{bmatrix}$

b) $2A = \begin{bmatrix} 6 & 2 \\ 8 & 4 \end{bmatrix}$

c) $2A = \begin{bmatrix} 8 & 4 \\ 6 & 2 \end{bmatrix}$

d) $2A = \begin{bmatrix} 2 & 4 \\ 6 & 8 \end{bmatrix}$

(v) For the straight line Y = -3X, the gradient and intercept are respectively

a) -3 and 0
b) -3 and +3
c) 0 and -3
d) -3 and -3

(vi) Select the center point and radius value of the circle which is given by following equation.

$(X-2)^2 + (Y+5)^2 = 9$

a) (-2,5) and 9
b) (-2,5) and 3
c) (2,-5) and 9
d) (2,-5) and 3

(vii) In an arithmetic progression with common difference 4 and sixth term is 15, find its 1st term.

a) -1
b) -5
c) 1
d) 5

(viii) Numbers that can be divided from 1 and the same number without remaining are known as,

a) Prime numbers
b) Real numbers
c) Rational numbers
d) Fraction numbers

(ix) Identify the sampling method which is considered about the heterogeneity of the population and it is divided in to homogeneous sub populations to obtain samples.

a) Simple random sampling
b) Cluster sampling

c) Stratified sampling

d) Systematic sampling.

(x) If there are 4000 cases in the population and you want a sample size of 400, what is the skip interval?

a) 4
b) 10
c) 40
d) 100

(xi) Select the correct statement regarding the mode of a data set.

a) Mode is always exist in the data set
b) Mode is the average value of the data set
c) Mode is the center value of the data set
d) Mode is the value that occurs the greatest number of times.

(xii) A population is consist of four observations (2, 4, 6, and 8). What is the standard deviation?

a) 2.23
b) 5
c) 15
d) 25

(xiii) What is the probability of getting a 3 when rolling a die?

a) 1/2
b) 1/3
c) 1/5
d) 1/6

(xiv) A coin is tossed in 4 times. What is the probability of getting all heads?

a) 0.5
b) 0.625
c) 6.25
d) 0.0625

(xv) Select the correct statement regarding the probability distribution.

a) Binomial and Poisson distributions are continuous.
b) Normal and t –distributions are discrete.
c) t- distribution is differ from normal distribution since it has degrees of freedom
d) Normal distribution is considered only for sample

(xvi) Find the Z value of the original value of 100 in a normally distributed random sample which is having population standard deviation of 5 and mean of 80.

a) -2
b) 2
c) 5
d) -5

PART II

Q 02. (Total 12 marks)

(i) Define, **(3 marks)**

a) Equal set

.....

b) Equivalent set

.....

c) Disjoint set

.....

(ii) Draw a separate Venn diagram for the different situation given bellow. **(3 marks)**

a) $A \cup B \cup C$ b) $(A \cap B \cap C)$ c) $A \subset B$

(iii)Factorize the following polynomial equation and find the values of x. **(3 marks)**

$x^2 + 7x + 10 = 0$

(iv)Differentiate following equation (find *dy/dx*) with respect to variable *x*. **(3 marks)**

$y = x^2 - 3x - 2$

Q 03. (Total 12 marks)

(i) What do you mean by a **random sample**? **(2 marks)**

(ii) Write four (04) methods of data presentations. **(4 marks)**

(iii) Find the probability that 3 out of 7 tosses of coin will result head. **(3 marks)**

(iv) The average number of cars sold by a company is 3 cars per day. What is the probability that exactly 4 cars will be sold tomorrow? **(3 marks)**

Equation is $(P(x,\lambda) = \frac{e^{-\lambda} \times \lambda^{x}}{x!}$, where e = 2.71828

PART III

Q.04. (Total marks 15)

(i) Convert following equation of a circle in to center-radius form. **(3 marks)**

$x^2 + y^2 - 4x + 10y + 20 = 0$

(ii) Find the sum of 25 terms of an arithmetic progression whose first term is -5 and common difference is 10. **(3 marks)**

(iii) If matrix A = $\begin{bmatrix} 1 & 4 & 3 \\ 7 & 2 & 1 \end{bmatrix}$, Matrix B = $\begin{bmatrix} 2 & 3 & 3 \\ 3 & 5 & 2 \end{bmatrix}$ and Matrix C = $\begin{bmatrix} 2 \\ 1 \\ 3 \end{bmatrix}$

Find,

a) A + B

b) A × C

c) B – A **(9 marks)**

Q.05. (Total marks 15)

(i) List three (03) weaknesses of mode. **(3 marks)**

(ii) A researcher went to a village to collect the information about 274 farmers who use three pesticides A, B and C. Among them 157 farmers use the pesticide A. 98 farmers use pesticide A only. 22 of them use all three while 14 of them use A and C but not B. 23 farmers use A and B only.45 farmers use B only. X number of farmers use B and C only and Y number of farmers use C only. At least one of these pesticides is used these selected farmers.

a) Show this information in a Venn diagram.
b) If 107 farmers use B how many farmers use B and C only (X)?
c) How many farmers use C only (Y)?
d) What is the percentage of the farmers who use at least two pesticides? **(6 marks)**

(iii) Find,
a) Mean
b) Variance
c) Standard deviation of following population.
10, 12, 09, 08, 09, 15, 07 **(6 marks)**

Q. 06. (Total marks 15)

(i) List three important characteristics of Binomial distribution. **(6 marks)**

(ii) There are 50 Friesian milking cows in a dairy farm. The average daily milk production of Friesian cows are normally distributed with population mean of 15 L and standard deviation of 4 L. If one cow is selected randomly what is the probability of having cow's daily milk production,

a) Between 12 L and 18 L.
b) More than 17 L
c) How many cows in the farm produce less than 10L per day? **(9 marks)**

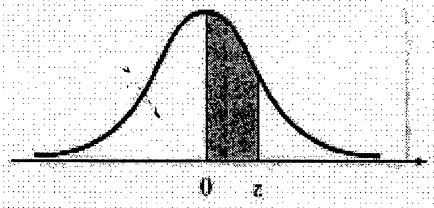
Q.07. (Total marks 15)

(i) List the three (03) special characters of t - distribution **(3 marks)**

(ii) List five (05) steps of 'Hypothesis testing" **(5 marks)**

(iii) A company selling poultry feeds wants to promote their new feed ration among the broiler farmers. One farmer wants to use this new feed ration if new ration could increase the body weight of broilers over 2.5 Kg as mention by the company. He conduct and experiment using a random sample of 50 birds and find that sample has a mean body weight of 2.8 Kg after feeding of new feed ration. If population standard deviation of body weight was 0.3 Kg, test whether farmer will purchase the feed. Test the hypothesis at significance level 0.05. **(7 marks)**

Areas under the standard normal distribution curve from 0 - z



z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
.0	.0000	.0040	.0080	.0120	.0160	.0199	.0239	.0279	.0319	.0359
.1	.0398	.0438	.0478	.0517	.0557	.0596	.0636	.0675	.0714	.0753
.2	.0793	.0832	.0871	.0910	.0948	.0987	.1026	.1064	.1103	.1141
.3	.1179	.1217	.1255	.1293	.1331	.1368	.1406	.1443	.1480	.1517
.4	.1554	.1591	.1628	.1664	.1700	.1736	.1772	.1808	.1844	.1879
.5	.1915	.1950	.1985	.2019	.2054	.2088	.2123	.2157	.2190	.2224
.6	.2257	.2291	.2324	.2357	.2389	.2422	.2454	.2486	.2517	.2549
.7	.2580	.2611	.2642	.2673	.2704	.2734	.2764	.2794	.2823	.2852
.8	.2881	.2910	.2939	.2967	.2995	.3023	.3051	.3078	.3106	.3133
.9	.3159	.3186	.3212	.3238	.3264	.3289	.3315	.3340	.3365	.3389
1.0	.3413	.3438	.3461	.3485	.3508	.3531	.3554	.3577	.3599	.3621
1.1	.3643	.3665	.3686	.3708	.3729	.3749	.3770	.3790	.3810	.3830
1.2	.3849	.3869	.3888	.3907	.3925	.3944	.3962	.3980	.3997	.4015
1.3	.4032	.4049	.4066	.4082	.4099	.4115	.4131	.4147	.4162	.4177
1.4	.4192	.4207	.4222	.4236	.4251	.4265	.4279	.4292	.4306	.4319
1.5	.4332	.4345	.4357	.4370	.4382	.4394	.4406	.4418	.4429	.4441
1.6	.4452	.4463	.4474	.4484	.4495	.4505	.4515	.4525	.4535	.4545
1.7	.4554	.4564	.4573	.4582	.4591	.4599	.4608	.4616	.4625	.4633
1.8	.4641	.4649	.4656	.4664	.4671	.4678	.4686	.4693	.4699	.4706
1.9	.4713	.4719	.4726	.4732	.4738	.4744	.4750	.4756	.4761	.4767
2.0	.4772	.4778	.4783	.4788	.4793	.4798	.4803	.4808	.4812	.4817