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)
Second Year, 2nd Semester Examination – 2015
CC 1202: Basic Mathematics and Statistics

Instructions for Candidates:
There are three parts(I,II,III)
Answer all questions
Answer questions on the paper itself for Part I & Part II (01 Hour)
Two (02) hours for part III
Calculators are allowed.
Mathematical tables are provided

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

Part-I

Q1. (16 Marks)

Select the correct answer and underline it on the paper itself. .

01. What is the gradient and intercept of the following line?

$3x + 4y = 12$

i. 3 and 12
ii. 4 and 12
iii. -3/4 and 3
iv. 3/4 and -3

02. Find the equation of a circle whose center is at (3, -3) and radius of 5

i. $(x-3)^2+ (y+3)^2 = 25$
ii. $(x-3)^2+ (y-3)^2 = 5$
iii, $(x+3)^2+ (y+3)^2 = 25$
iv. $(x+3)^2+ (y-3)^2 = 5$

03. What is the set of prime numbers from the following?

i. P = {1, 2, 4, 6}
ii.P = {2, 5, 9, 10}
iii. P = {1, 2, 6, 10}
iv. P = {1, 2, 5, 7}

04. What is the correct statement of equal set?

i. Two sets that have the exact same elements
ii. A set with an equal number of elements
iii. The set has a finite numbers of elements
iv. The two sets that have no elements in common

05. What is the transpose of A?

$$A = \begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{pmatrix}$$

i. A' = $\begin{pmatrix} 4 & 1 \\ 5 & 2 \\ 6 & 3 \end{pmatrix}$

ii. A' = $\begin{pmatrix} 1 & 4 \\ 2 & 5 \\ 3 & 6 \end{pmatrix}$

iii. A' = $\begin{pmatrix} 1 & 3 & 5 \\ 2 & 4 & 6 \end{pmatrix}$

iv. A' = $\begin{pmatrix} \\ \\ \end{pmatrix}$

06. What is the correct statement in relation to the identity matrix (I)?

i. A matrix with one column
ii. A matrix has equal number of rows columns
iii. A matrix is a square matrix with all the non diagonal elements become zero
iv. A matrix has all the diagonal elements equal 1

07. What is the factorial 5 (5!)?

i. 120
ii. 25
iii. 20
iv. 0

08. What is the answer of the differentiation for the following equation?

$Y = -x^2 + 4x + 5$

i. $2x + 4$
ii. $-2x + 4$
iii. $-x^2 + 4x$
iv. None of above

09. Select the discrete variable from the following.

i. Height of a student
ii. Distance traveled by a car
iii. Number of calls received by a telepho

iv. Weight of a flour bag

10. What is the **incorrect** statement on probabilistic sampling?
    i. Every item in the population has an equal chance to be in a sample
    ii. Stratified sampling is a type of probabilistic sampling
    iii. It is not essential that every item has an equal probability
    iv. This method can be used to select a proper sample accomplishing target

11. What is the median of the following data set?
    60, 68, 24, 33, 74, 70, 44, 53
    i. 53.5
    ii. 56.5
    iii. 53.25
    iv. 51.5

12. What is the variance and standard deviation of the following data set?
    5, 9, 13, 17, 21, 25

    i. 46.67, 6.83
    ii. 41.25, 3.41
    iii. 15, 6.83
    iv. 50.5, 4.52

13. What is the value of ${}^{4}P_{2?}$

    i. 8
    ii. 24
    iii. 12
    iv. 0

14. What is the two tail test from the following?
    i. $H_0 = \mu = \mu_0$
       $H_1 = \mu \neq \mu_0$

    ii. $H_0 = \mu \geq \mu_0$
       $H_1 = \mu < 50$

    iii. $H_0 = \mu \leq \mu_0$
       $H_1 = \mu > 50$
    iv. None of above

15. Select the place where t test is applicable?

i. Large population and population standard deviation are known
ii. Sample size is small and population standard deviation is unknown
iii. Small population and sample standard deviation are unknown
iv. None of above

16. What is the Z score value for the original value of 39.5 in a normally distributed random sample (standard deviation =8, mean= 56)

i. -0.5
ii. 0.8
iii. 2.06
iv. -2.06

Part II

Q2. (12 Marks)

i. Write four (04) properties of the standard normal curve (04 marks)

……
……
……..
……

ii. Find the area under the standard normal curve, between z = 2.15 and z = 1.24 (04 marks)

……..
……
……..
……
……
……

iii. What is the –Z (minus) value when the area under the standard normal curve is 0.0874? (04 marks)

……..
……..
……
……..
……..
……..

03. i. What is the probability of obtaining following values, if a lottery ticket is picked up randomly from a group of tickets numbered 1 to 100?

a. An Even number (02 marks)

……..
……..

b. 5 or multiple of it (02 marks)

…….

……..

c. Value above 75 (02 marks)

……

…….

ii. What is the 25^{th} term of the arithmetic progression when the first term is 20 and common difference is 4? (03 marks)

……..

……

……

…….

……..

……

iii. Factorize the following polynomial equation and find the value of x, when the equation is $x^2 – x – 6 = 0$. (03 marks)

……..

…….

…….

……..

……

Part III

Q .04

i. Give an example for each matrices given below.

a. Raw matrix (02 marks)

b. Zero matrix (02 marks)

c. Unit matrix (Identity matrix) (02 marks)

ii. Find A + B if

A = $\begin{pmatrix} 3 & 5 \\ 6 & 2 \end{pmatrix}$ B = $\begin{pmatrix} 4 & 7 \\ 8 & 1 \end{pmatrix}$ (03 marks)

iii. Let A = $\begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$ B = $\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$

Prove A x B = B x A (06 marks)

Q. 5.

i. Draw separate Venn diagrams for the different situations given bellow

a. A∩B (01 mark)

b. A⊂ B (01 mark)

c. A∪ B (01 marks)

ii. Following information was found regarding the cultivation of paddy, vegetable and betel from a survey of 80 people in a village.

- 36 people cultivate paddy
- 42 people cultivate vegetable
- 30 people cultivate betel
- 17 people cultivate vegetable and betel
- 14 people cultivate paddy and betel

- 8 people cultivate all these varieties
- 15 people do not cultivate any of these

a. Draw a suitable Venn diagram to illustrate the above information (06 marks)
b. Find the number of people who cultivate paddy and vegetables but not betel (1.5 marks)
c. Find the number of people whom cultivate paddy only (1.5 marks)
d. Find the number of people who cultivate only two of these varieties (1.5 marks)
e. How many people do not cultivate betel from those who cultivate paddy (1.5 marks)

Q6.

i. Briefly explain the terms, "Population" and "Sample" (04 marks)
ii. Name four methods of sampling techniques. (04 marks)
iii. Find the
   a. Range
   b. Lower quartile
   c. Upper quartile
   d. Inter quartile range (IQR) by using following set of numbers (07 marks)

40 82 56 88 30 24 46 74 66 44 74 94 60 86 52 36

Q7.

i. Write two assumptions when developing a hypothesis testing. (02 marks)
ii. Briefly explain the type of errors in hypothesis testing (04 marks)
iii. The height of maize plants is normally distributed.

A farmer finds that the mean height of all maize plants in his field is greater than 118 cm. It is known that the standard deviation of height of all maize plants is 32 cm. A random sample of 40 maize plants from his field showed a mean of 128 cm. Test the farmer's findings at the 5% significant level. (09 marks)

z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.0000	0.0040	0.0080	0.0120	0.0160	0.0199	0.0239	0.0279	0.0319	0.0359
0.1	0.0398	0.0438	0.0478	0.0517	0.0557	0.0596	0.0636	0.0675	0.0714	0.0753
0.2	0.0793	0.0832	0.0871	0.0910	0.0948	0.0987	0.1026	0.1064	0.1103	0.1141
0.3	0.1179	0.1217	0.1255	0.1293	0.1331	0.1368	0.1406	0.1443	0.1480	0.1517
0.4	0.1554	0.1591	0.1628	0.1664	0.1700	0.1736	0.1772	0.1808	0.1844	0.1879
0.5	0.1915	0.1950	0.1985	0.2019	0.2054	0.2088	0.2123	0.2157	0.2190	0.2224
0.6	0.2257	0.2291	0.2324	0.2357	0.2389	0.2422	0.2454	0.2486	0.2517	0.2549
0.7	0.2580	0.2611	0.2642	0.2673	0.2704	0.2734	0.2764	0.2794	0.2823	0.2852
0.8	0.2881	0.2910	0.2939	0.2967	0.2995	0.3023	0.3051	0.3078	0.3106	0.3133
0.9	0.3159	0.3186	0.3212	0.3238	0.3264	0.3289	0.3315	0.3340	0.3365	0.3389
1.0	0.3413	0.3438	0.3461	0.3485	0.3508	0.3531	0.3554	0.3577	0.3599	0.3621
1.1	0.3643	0.3665	0.3686	0.3708	0.3729	0.3749	0.3770	0.3790	0.3810	0.3830
1.2	0.3849	0.3869	0.3888	0.3907	0.3925	0.3944	0.3962	0.3980	0.3997	0.4015
1.3	0.4032	0.4049	0.4066	0.4082	0.4099	0.4115	0.4131	0.4147	0.4162	0.4177
1.4	0.4192	0.4207	0.4222	0.4236	0.4251	0.4265	0.4279	0.4292	0.4306	0.4319
1.5	0.4332	0.4345	0.4357	0.4370	0.4382	0.4394	0.4406	0.4418	0.4429	0.4441
1.6	0.4452	0.4463	0.4474	0.4484	0.4495	0.4505	0.4515	0.4525	0.4535	0.4545
1.7	0.4554	0.4564	0.4573	0.4582	0.4591	0.4599	0.4608	0.4616	0.4625	0.4633
1.8	0.4641	0.4649	0.4656	0.4664	0.4671	0.4678	0.4686	0.4693	0.4699	0.4706
1.9	0.4713	0.4719	0.4726	0.4732	0.4738	0.4744	0.4750	0.4756	0.4761	0.4767
2.0	0.4772	0.4778	0.4783	0.4788	0.4793	0.4798	0.4803	0.4808	0.4812	0.4817
2.1	0.4821	0.4826	0.4830	0.4834	0.4838	0.4842	0.4846	0.4850	0.4854	0.4857
2.2	0.4861	0.4864	0.4868	0.4871	0.4875	0.4878	0.4881	0.4884	0.4887	0.4890
2.3	0.4893	0.4896	0.4898	0.4901	0.4904	0.4906	0.4909	0.4911	0.4913	0.4916
2.4	0.4918	0.4920	0.4922	0.4925	0.4927	0.4929	0.4931	0.4932	0.4934	0.4936
2.5	0.4938	0.4940	0.4941	0.4943	0.4945	0.4946	0.4948	0.4949	0.4951	0.4952
2.6	0.4953	0.4955	0.4956	0.4957	0.4959	0.4960	0.4961	0.4962	0.4963	0.4964
2.7	0.4965	0.4966	0.4967	0.4968	0.4969	0.4970	0.4971	0.4972	0.4973	0.4974
2.8	0.4974	0.4975	0.4976	0.4977	0.4977	0.4978	0.4979	0.4979	0.4980	0.4981
2.9	0.4981	0.4982	0.4982	0.4983	0.4984	0.4984	0.4985	0.4985	0.4986	0.4986
3.0	0.4987	0.4987	0.4987	0.4988	0.4988	0.4989	0.4989	0.4989	0.4990	0.4990