

Total No. of Questions : 5]

SEAT No. :

P5129

[5823] - 201

[Total No. of Pages : 2

**First Year B.Sc. (Computer Science)
CS 121 : ADVANCED 'C' PROGRAMMING
(CBCS 2019 Pattern) (Semester - II)**

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *Figures to the right indicate full marks.*
- 2) *All questions are compulsory.*

Q1) Attempt any EIGHT of the following.

[8×1=8]

- a) What is the use of strcpy() function in C?
- b) Demonstrate puts () function.
- c) What is file opening mode.
- d) What is pointer variable? Give example.
- e) What is macro?
- f) What is the use of strcat () function.
- g) What is command line argument.
- h) Demonstrate type def keyword with example.
- i) What is string? Give example.
- j) Demonstrate “structure within structure” with example.

Q2) Attempt any FOUR of the following (Out of FIVE)

[4×2=8]

- a) Differentiate between static & dynamic memory allocation.
- b) Explain the file opening modes for text file.
- c) What is the use of # include directive.
- d) Explain the use of fgets() and fputs() with suitable example.
- e) Explain in brief concept of macros.

P.T.O.

Q3) Attempt any TWO of the following (Out of THREE) **[2×4=8]**

- a) Write a 'C' program to calculate area, & perimeter and diameter of circle using one function for all & use pointers.
- b) Write a 'C' program to accept a string & convert in uppercase without using built - in function.
- c) Write a 'C' program to accept a time from user as hh:mm:ss & check the validity of it. If it is invalid, validate it. Use pointer to structure.

Q4) Attempt any TWO of the following (Out of THREE) **[2×4=8]**

- a) Write a program in 'C' to accept details 'n' employees & print the details of highest salaried employee. Use structure to store the employee data.
- b) Differentiate macros and functions.
- c) Explain following functions with syntax and example.
fgetc(), fputc(), fscanf (), fprintf ().

Q5) Attempt any ONE of the following (Out of TWO) **[1×3=3]**

- a) What is the output of following code?

```
# include <stdio.h>
int main ()
{
    char str[100];
    char *ptr;
    strcpy(str, "India is GREAT");
    ptr = str + strlen (str)
    printf ("The string is:");
    while (*ptr != str)
    printf ("%c", *ptr --);
    return 0;
}
```

- b) Differentiate structure and union.



Total No. of Questions : 5]

SEAT No. :

[Total No. of Pages : 2

P5130

[5823]-202

First Year B.Sc. (Computer Science)
CS-122: Relational Database Management Systems
(2019 Pattern)(Semester II)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *Total number of questions are 5.*
- 2) *Total marks assigned 35.*
- 3) *Time assigned 2 hours.*

Q1) Attempt any Eight of the Following:

[8×1=8]

- a) What do you mean by trigger?
- b) State the different ways to call a PL/SQL function.
- c) What is the concurrent schedule?
- d) Define deadlock.
- e) What is audit trail?
- f) What do you mean by referential Integrity?
- g) What is the use of commit command?
- h) what is log?
- i) Define distributed database.
- j) Which are the types of NOSQL database?

Q2) Attempt any four of the following

[4×2=8]

- a) Explain types of cursor.
- b) Draw the state diagram of the transaction.
- c) Write down use and syntax of GRANT command.
- d) Which are the schemes of the recovery from concurrent transactions?
- e) Which are the characteristics of big data?

P.T.O.

Q3) Attempt any two of the following:

[2×4=8]

- a) Explain variations of two phase locking.
- b) Define transaction. Explain ACID properties of transaction.
- c) Explain mandatory access control method.

Q4) Attempt any two of the following:

[2×4=8]

- a) Write a plpgsql function that accepts student credit out of 10 marks and returns grade based on eligibility as -
If credit is less than 5 → C grade
If credit is less than 7 → B grade
If credit is above 7 → A grade
- b) Consider the following transaction. Give two non-serial Schedules that the serializable.

| T1 | T2 |
|----------|----------|
| Read(X) | Read(Y) |
| X=X+5000 | Y=Y+2000 |
| Write(X) | Write(Y) |
| Read(Y) | Read(Z) |
| Y=Y-1500 | Z=Z-3100 |
| Write(Y) | Write(Z) |

C) Explain encryption techniques used for database security.

Q5) Attempt any ONE of the following :

[1×3=3]

- a) Explain time stamp based protocol with read write conflicting conditions.
- b) Explain failure Classification



Total No. of Questions : 3]

SEAT No. :

[Total No. of Pages : 2

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[5823] - 203

F.Y.B.Sc.

COMPUTER SCIENCE

Mathematics

MTC-121 : Linear Algebra

(2019 Pattern) (Semester -II)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicates full marks.*
- 3) *Use of single memory, non-programmable scientific calculator is allowed.*

Q1) Attempt any five of the following.

[10]

- a) Define subspace of a vector space. Give one example of subspace of a vector space \mathbb{R}^2 .
- b) If $\vec{u} = (1, 2, -1)$ and $\vec{v} = (2, 0, 2)$ then find angle between \vec{u} and \vec{v} .
- c) Write the standard basis for $P_2(\mathbb{R})$. Also write it's dimension.
- d) Is the transformation $T : \mathbb{R}^2 \rightarrow \mathbb{R}^2$ defined by $T(x, y) = (2x, 1)$ is linear? Justify.
- e) Define the following terms:
 - i) Affine set
 - ii) Convex combination of Vectors
- f) Find the matrix of quadratic form given below:
$$Q(x) = 3x_1^2 + 2x_2^2 - 5x_3^2 - 6x_1x_2 + 3x_1x_3 - 4x_2x_3.$$
- g) Find the distance between vectors.

$$X = \begin{bmatrix} 10 \\ -3 \end{bmatrix} \text{ and } Y = \begin{bmatrix} -1 \\ -5 \end{bmatrix}.$$

P.T.O.

Q2) Attempt any three of the following. **[15]**

- a) If W_1 and W_2 are subspaces of a vector space Y , then prove that $W_1 \cap W_2$ is a subspace of V . Is $W_1 \cup W_2$ is a subspace of V ? Justify.
- b) Find rank of following matrix A and hence write it's nullity.

$$A = \begin{bmatrix} 1 & 1 & 0 & -1 \\ 1 & 2 & 3 & 0 \\ 2 & 3 & 3 & -1 \end{bmatrix}.$$

- c) Find all eigenvalues of the following matrix A & hence state whether it is diagonalizable.

$$A = \begin{bmatrix} -1 & 4 & -2 \\ -3 & 4 & 0 \\ -3 & 1 & 3 \end{bmatrix}.$$

- d) Determine whether $S = \{\bar{u}_1, \bar{u}_2, \bar{u}_3\}$ is a basis for \mathbb{R}^3 where $\bar{u}_1 = (2, -1, 3)$, $\bar{u}_2 = (4, 1, 3)$ $\bar{u}_3 = (8, -1, 8)$.
- e) Classify the quadratic form given below $Q(x) = 4x_1^2 - 4x_1x_2 + 4x_2^2$.

Q3) Attempt any one of the following. **[10]**

- a) Check whether the following matrix is diagonalizable. If yes find the matrix P that diagonalizes A .

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

- b) i) Express $P = 1 + 2x - x^2$ as a linear combination of $P_1 = 1+x$, $P_2 = 1-x$ and $P_3 = x^2$.
- ii) Define orthonormal set. Determine whether the given set $S = \{\bar{u}_1, \bar{u}_2, \bar{u}_3\}$ is orthonormal or not, where.

$$\bar{u}_1 = \begin{bmatrix} 1/\sqrt{10} \\ 3/\sqrt{20} \\ 3/\sqrt{20} \end{bmatrix} \quad \bar{u}_2 = \begin{bmatrix} 3/\sqrt{10} \\ -1/\sqrt{20} \\ -1/\sqrt{20} \end{bmatrix} \quad \bar{u}_3 = \begin{bmatrix} 0 \\ -1/\sqrt{2} \\ 1/\sqrt{2} \end{bmatrix}$$



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[5823]-204

F.Y.B.Sc. (Computer Science)

MATHEMATICS

MTC-122 : Graph Theory

(2019 Pattern) (Semester-II) (Paper-II)

Time : 2 Hours]

[Max. Marks : 35

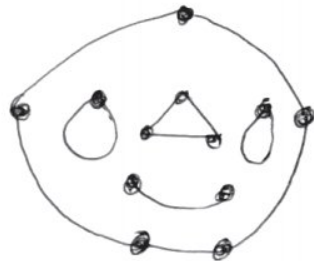
Instructions to the candidates:

- 1) All questions are compulsory.
- 2) Figures to the right indicate full marks.
- 3) Neat diagrams must be drawn wherever necessary.

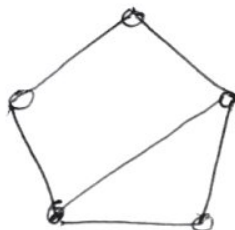
Q1) Attempt any five of the following

[10]

- a) Draw K_6 , the complete graph on 6 vertices.
- b) Define regular graph. Also draw one example of a 2-regular graph.
- c) What is the number of connected components in the following graph?

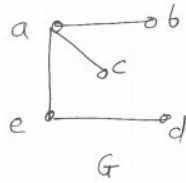


- d) Determine whether the following graph is a bipartite graph. Justify.



P.T.O.

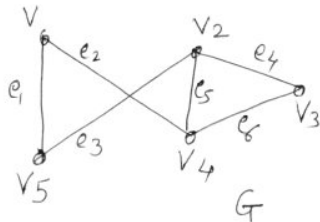
e) Draw the complementary graph \bar{G} of the following graph G.



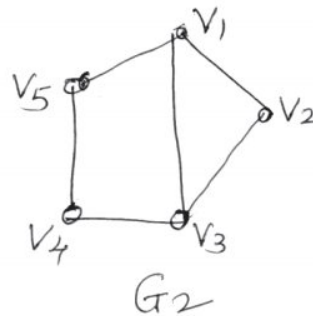
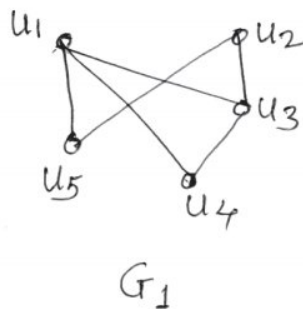
- f) How many edges are there in a regular graph of degree 3 with 6 vertices?
 g) Define : Tree. Draw an example of a tree.

Q2) Attempt any three of the following. [15]

a) Write the adjacency matrix and incidence matrix for the following graph G.



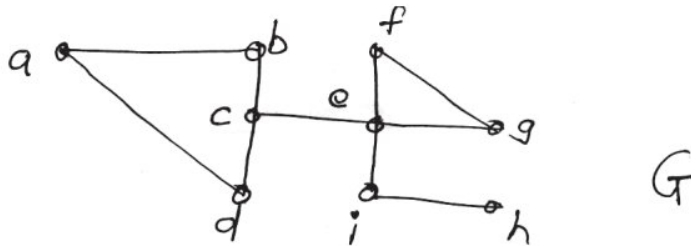
b) Show that the following graphs G_1 and G_2 are isomorphic.



- c) Draw 10 nonisomorphic simple graphs with 4 vertices.
 d) Give an example of a graph which has-
 i) Euler circuit but not Hamilton circuit.
 ii) Euler circuit as well as Hamilton circuit.
 e) Construct a complete binary tree of height 4. How many leafs it has?

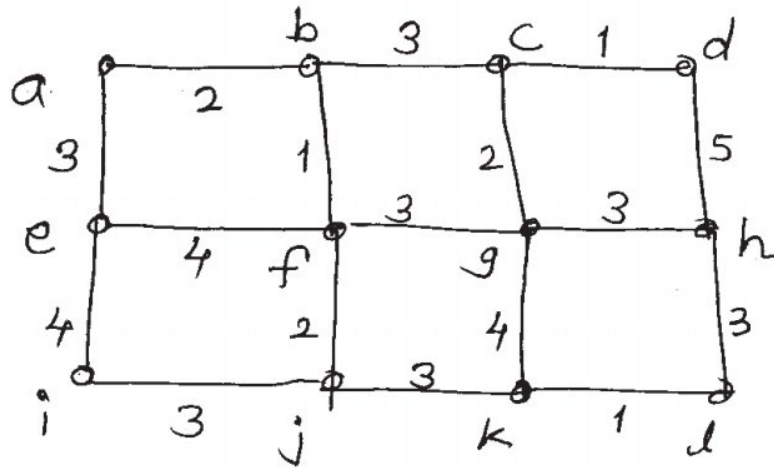
Q3) Attempt any one of the following. [10]

a) For the given graph G answer the following questions



- ii) List all cutvertices in G .
- iii) List all cycles in G .
- iv) List any two distinct paths from the vertex a to vertex h in G .
- v) Verify Handshaking lemma for this graph.

- b) i) Explain the “ seven bridges problem of Konigsberg”.
- ii) Use Kruskal’s algorithm to find a minimum spanning tree in the following weighted graph given below.



Total No. of Questions : 5]

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F.Y.B.Sc. (Computer Science)

ELECTRONIC SCIENCE

ELC - 121 : Instrumentation Systems

(Semester - II) (New CBCS 2019 Pattern) (Paper - I)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) Question 1 is compulsory.
- 2) Solve any three questions from Q.2 to Q.5.
- 3) Figures to the right indicate full marks.
- 4) Draw neat diagrams wherever necessary.
- 5) Questions 2 to 5 carry equal marks.

Q1) Solve any five of the following.

[5×1=5]

- a) Define actuator with one example.
- b) State any two applications of PIR sensor.
- c) Draw the circuit diagram for unity gain amplifier using opamp.
- d) Calculate the output voltage of LM35 for 45°C temperature.
- e) Which are two types of film sensors?
- f) Draw the symbol of OPAMP and label it.

Q2) a) Attempt any two of the following.

[2×3=6]

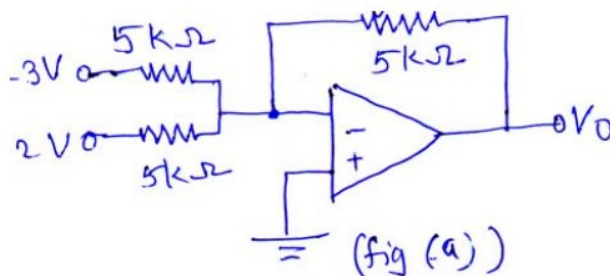
- i) Describe block diagram of instrumentation system.
 - ii) Describe working of CCD image sensor.
 - iii) Draw smart instrumentation system. Give two advantages.
- b) Draw circuit diagram of op-amp based voltage to current converter and explain its working.

[1×4=4]

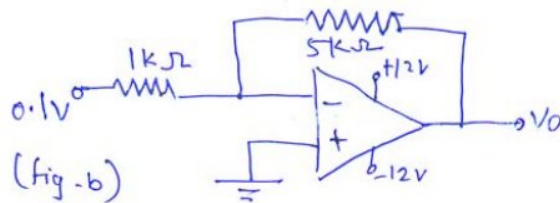
Q3) a) Attempt any two of the following.

[2×3=6]

- i) Explain working principle of ultrasonic sensor and state any two applications.
 - ii) Explain the concept of nano sensor.
 - iii) Explain the working of PIR sensor.
- b) Identify the following configurations and find their output voltage.[1×4=4]



P.T.O.



Q4) a) Attempt any two of the following. **[2×3=6]**

- i) Discuss the concept of active and passive sensors with example.
- ii) Draw the circuit diagram of non-inverting amplifier for op-amp. Derive the expression for its output voltage.
- iii) Explain op-amp as comparator.

b) Explain construction and working of DC motor. **[1×4=4]**

Q5) Attempt any four of the following. **[4×2.5=10]**

- a) Define the following term for sensor.
 - i) Resolution.
 - ii) Linearity.
- b) Explain working principle of tilt sensor.
- c) List any five features of LM35 temperature sensor.
- d) Draw the block diagram of op-amp. State ideal value of input offset voltage.
- e) State any five advantages of smart sensor.
- f) Explain the concept of virtual ground with neat diagram.



Total No. of Questions : 5]

SEAT No. :

P5134

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[Total No. of Pages : 2

F.Y.B.Sc. (Computer Science)

ELECTRONIC SCIENCE

ELC-122 : Basics of Computer Organization

(New 2019 Pattern) (CBCS) (Semester -II) (Paper-II)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *Question 1 is compulsory.*
- 2) *Solve any three questions from Q2 to Q5.*
- 3) *Figures to the right indicate full marks.*
- 4) *Draw neat diagrams wherever necessary.*
- 5) *Questions 2 to 5 carry equal marks.*

Q1) Solve any five of following.

[5×1=5]

- a) _____ number of address lines are required for the memory of 2 MB capacity.
- b) Write the full forms with respect to Computer Organization.
CPU - _____
PC- _____
- c) What is the role of stack pointer in Computer Organization?
- d) Write any two applications of counter.
- e) Draw the logic symbol of J-K flip-flop
- f) What is significance of data bus in Computer Organization?

Q2) a) Answer any two of the following.

[2×3=6]

- i) Draw the neat logic diagram of R-S flip flop using NAND gates. Also write down its truth table.
 - ii) Explain the need of Input output interface in Computer Organization.
 - iii) Write three point difference between Synchronous Counter and Asynchronous counter.
- b) With neat block diagram explain four level memory hierarchy. **[4]**

P.T.O.

- Q3) a)** Answer any two of the following ; **[2×3=6]**
- i) Design a memory of (1K×16) using available memory chip of size (1K×4). The memory is of RAM type.
 - ii) Explain T Flip-Flop using J-K Flip-Flop with neat logic diagram. Draw the wave forms of clock and output.
 - iii) Draw logic diagram of 3 bit SISO shift register in right shift mode and explain its working.
- b) Draw neat block diagram of CPU and Explain working of each block.[4]

- Q4) a)** Answer any Two of the following. **[2×3=6]**
- i) Explain the operation of ring counter with neat logic diagram.
 - ii) Explain the concept of memory stack organization with diagram.
 - iii) Discuss various types of memories used in computer system in short.
- b) Explain working of 3-bit Asynchronous up counter with logic diagram, Truth table and timing diagram. **[4]**

- Q5)** Answer any four of the following. **[10]**
- a) Explain in short Race around condition in J-K Flip Flop
 - b) Draw logic diagram of PISO shift register.
 - c) What is role of Cache memory in computer organization.
 - d) Write a short note on Virtual memory.
 - e) Explain basic Computer Organization with block diagram.
 - f) Calculate average Access time of memory if hit ratio is 95%, Cache memory access time is 400 nsec and main memory access time is 900 nsec.



Total No. of Questions : 5]

SEAT No. :

P5135

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[Total No. of Pages : 2

First Year B.Sc. (Computer Science)

STATISTICS

CSST-121 : METHODS OF APPLIED STATISTICS

(2019 Pattern) (Semester -II) (Paper-I)

Time :2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicate full marks.*
- 3) *Use of calculator and statistical tables is allowed.*
- 4) *Symbols and abbreviations have their usual meaning.*

Q1) Choose the most appropriate alternative for each of the following: **[1 each]**

- i) The diagram which visualizes the correlation between two variables is.
 - a) Scatter diagram
 - b) Histogram
 - c) Bar diagram
 - d) Pie diagram
- ii) The number of normal equations required to fit the curve $Y=ab^X$ are
 - a) Four
 - b) Two
 - c) One
 - d) Three
- iii) Partial correlation coefficient $r_{12.3}$ is the simple correlation between
 - a) X_1 and X_2
 - b) X_1 and X_2 when linear effect of X_3 is eliminated from each of them.
 - c) X_1 and X_3
 - d) X_1 and X_3 when linear effect of X_2 is eliminated from each of them.
- iv) In time series the data are arranged in
 - a) Chronological order
 - b) Geographical order
 - c) Alphabetical order
 - d) Numerical order

Q2) Attempt any five of the following;

[2 each]

- a) Define bivariate data with one example.
- b) State the types of correlation giving one illustration each.
- c) Define Karl Pearson's coefficient of correlation.
- d) Explain the term regression.

P.T.O.

- e) If $b_{XY}=0.4$, $b_{YX}=1.6$, then find $r(X,Y)$.
- f) Define coefficient of determination. And state its interpretation.
- g) Define multiple correlation coefficient for a trivariate data.
- h) State the additive and multiplicative models of time series.

Q3) Attempt any two of the following: [4 each]

- a) Six entries at a song competition were rated by two judges X and Y as follows.

| | | | | | | |
|------------|---|---|---|---|---|---|
| Ranks by X | 5 | 6 | 4 | 3 | 2 | 1 |
| Ranks by Y | 6 | 2 | 1 | 3 | 4 | 5 |

Compute Spearman's rank correlation coefficient between X and Y.

- b) For a trivariate data: $r_{12}=0.6$, $r_{13}=0.4$, if $R_{1,23}=1$, find the value of r_{23} .
- c) What is time series? Explain 'Trend' as a component of time series.

Q4) Attempt any Two of the following [4 each]

- a) In the regression analysis the equation of two lines of regression are $2X+3Y=8$ and $X+2Y=5$, find mean values of X and Y.
also, define the following terms: Covariance, regression coefficient of Y on X.
- b) Explain the concept of multiple regression, Also, state the equation of multiple regression plane of X_1 and X_2 and X_3 .
- c) Describe the stepwise procedure of fitting the curve of the type $Y=a+bX+cX^2$ to the bivariate data using the method of least squares.

Q5) Attempt any one of the following: [5each]

- a) Describe the stepwise procedure of fitting a line of regression of Y on X to the bivariate data using method of least squares.
- b) Fit a straight line trend by the method of least squares to the following data:

| | | | | | |
|---------------------------|------|------|------|------|------|
| Year | 2015 | 2016 | 2017 | 2018 | 2019 |
| Production (in tonnes) | 14 | 11 | 13 | 15 | 16 |



Total No. of Questions : 4]

SEAT No. :

P5136

[Total No. of Pages : 2

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First Year B.Sc. (Computer Science)

STATISTICS

CSST - 122 : Continuous Probability Distributions and Testing of Hypothesis

(2019 Pattern) (Semester - II) (Paper- II)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicate full marks.*
- 3) *Use of non-programmable scientific calculator is allowed.*
- 4) *Use of statistical tables is allowed.*
- 5) *Symbols have their usual meaning unless otherwise stated.*

Q1) Answer EACH of the following by selecting most appropriate option.

[1 mark each]

- a) IF $X \sim U(3, 8)$ then $F(5)$ is
 - i) $1/5$
 - ii) $3/5$
 - iii) $2/5$
 - iv) 1
- b) A random variable X has an exponential distribution with mean 5. Then variance of X is
 - i) 2.5
 - ii) 5
 - iii) 25
 - iv) 0
- c) A random variable X has Pareto distribution with $\alpha = 3$, then mean of X is
 - i) 3
 - ii) 9
 - iii) 1.5
 - iv) 0.75
- d) The probability of rejecting H_0 when it is true is called as
 - i) type I error
 - ii) Type II error
 - iii) level of significance
 - iv) standard error
- e) In a test of hypothesis problem, the sample size is 57, then this test is called as
 - i) small sample test
 - ii) small population test
 - iii) large sample test
 - iv) large population test

P.T.O.

Q2) Answer any TWO of the following: [5]

- a) Define exponential distribution with mean = 0. State its lack of memory property and give one example of this property.
- b) Describe procedure of testing mean of a population when sample size is large.
- c) Let X follows normal distribution with mean 2 and variance 16. If $Y = (3X + 2)$, find
 - i) $P(Y > 8)$ and
 - ii) $P(6 < Y < 9)$.

Q3) Answer any TWO of the following: [5]

- a) Describe procedure of drawing a sample of size n from $N(\mu, \sigma^2)$ using Box-Muller transformation.
- b) Define normal distribution. State any three properties of normal distribution.
- c) In a sample of 7 observations, the sum of squared deviations from the mean is 94.5. In another sample of 10 observations, the sum of squared deviations from the mean is 101.7. Test whether the two variances are significantly different at 10% level of significance.

Q4) Answer any ONE of the following.

- a)
 - i) Define each of the following. [5]
Parameter
Statistic
Null hypothesis
Alternate hypothesis
Type II error
 - ii) Theory predicts that the proportion of beans in 3 groups A, B and C should be in the ratio 1 : 2 : 3. In an experiment on 300 beans, the frequencies in the 3 groups were 45, 105 and 150 respectively. Does the experiment support the theory at 5% level of significance? Justify your answer. [5]
- b)
 - i) Describe procedure of paired - t test. [5]
 - ii) A certain factory runs in two shifts. A sample of 100 articles selected from production of day shift gave 52 defective articles whereas a sample of 700 articles selected from production of night shift gave 45 defective articles. Can we conclude that proportion of defective articles in the day shift is significantly less than that of night shift at 5% level significance? [5]