

This question paper contains 4 printed pages]

Roll No.

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S. No. of Question Paper : 7935

Unique Paper Code : 62341101

HC

Name of the Paper : Computer Fundamentals

Name of the Course : B.A. (P) Computer Science

Semester : I

Duration : 3 Hours

Maximum Marks : 75

(Write your Roll No. on the top immediately on receipt of this question paper.)

Question No. 1 is compulsory.

Attempt any five questions from Q. No. 2 to Q. No. 8.

Parts of a question must be answered together.

1. (a) Define supercomputer. Give two examples of supercomputer. 3

(b) Give full form of the following abbreviations : 3

(i) PDA

(ii) ASCII

(iii) CMOS.

P.T.O.

- (c) Define a bit and a byte. What are the *two* key factors that characterize the memory ? 4
- (d) Find 1's complement of the following numbers : 2
- (11000011.1101)<sub>2</sub>.
- (e) Explain any *two* pointing devices with examples. 5
- (f) Describe Cache Memory. 3
- (g) Briefly explain e-library. 2
- (h) What is an operating system ? Name any *two*. 3
2. (a) Differentiate between Microcomputer and Minicomputer with examples. 4
- (b) Explain the main components of computer hardware with diagram. 6
3. (a) What is ROM ? Explain different types of ROM. 4
- (b) Explain the memory hierarchy with diagram. 6

4. (a) Give differences between the following : 6

(i) Input unit and Output unit

(ii) Dot matrix printers and Daisy wheel printers

(iii) Hand-held scanners and flat-bed scanners.

(b) Describe touch screen with its working. 4

5. Convert the following : 10

(i)  $(47.25)_8$  to  $(?)_{10}$

(ii)  $(675.125)_{10}$  to  $(?)_2$

(iii)  $(473.28)_{10}$  to  $(?)_{16}$

(iv)  $(AB.28)_{16}$  to  $(?)_{10}$

(v)  $(1111.0011)_2$  to  $(?)_{10}$ .

6. Perform the binary operations : 10

(i)  $(111011.1101)_2 + (111.11011)_2$

(ii)  $(1110.1101)_2 - (1001.1111)_2$ .

7. (a) Explain *three* parameters use to measure the performance of a computer system. 6
- (b) What do you understand by ports and interfaces ? Explain any *three* types of ports. 4
8. Write short notes on the following terms (any *four*) : 10
- (i) Cloud computing
  - (ii) Monitor
  - (iii) Anti-virus
  - (iv) BIOS
  - (v) Data Mining.

This question paper contains 4 printed pages]

Roll No.

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S. No. of Question Paper : 7976

Unique Paper Code : 62344328

HC

Name of the Paper : Computer Networks and Internet  
Technologies

Name of the Course : B.A. (Programme) Computer Application

Semester : III

Duration : 3 Hours

Maximum Marks : 75

(Write your Roll No. on the top immediately on receipt of this question paper.)

Question No. 1 is compulsory.

Attempt any five questions from Q. Nos. 2 to 8.

Parts of a question must be answered together.

Marks are indicated against each question.

1. (a) Explain the use of heading tag in HTML. 2
- (b) Differentiate between the following : 2+2
- (i) Repeater and Bridge
- (ii) Half Duplex and Full Duplex Link.
- (c) Write the code to create the following structure in HTML : 2

$$X^2 + Y + Z^3 = 2$$

P.T.O.

- (d) What is role of IP protocol in the TCP/IP reference model ? 2
- (e) What is Mesh Topology ? Give *two* advantages and *two* disadvantages of mesh topology. 3
- (f) What is the job of HTTP protocol ? 3
- (g) What is an event in JavaScript ? Explain "Blur" and "Focus" events. 3
- (h) Write a command to create a link to a webpage in an HTML file. 2
- (i) Describe, how the properties of radio waves change with change in frequency. 2
- (j) Differentiate between CELLSPACING and CELLPADDING attribute of the TABLE tag. 2
2. (a) Define URL. What are its different parts ? How is URL different from URI ? 5
- (b) What is UDP protocol ? How is it different from TCP ? 5
3. (a) Explain any 5 uses of computer networks. 5
- (b) List 5 components in data communication system. 5
4. (a) Compare the characteristics of fiber optics and twisted pair. 5
- (b) What is TCP/IP reference model ? Briefly explain all layers of TCP/IP reference model. 5

( 3 )

5. (a) List any *five* characteristics of JavaScript language. 5
- (b) Name the tags used to perform the following functions in an HTML file : 5
- (i) To underline some message
  - (ii) To insert a table row
  - (iii) To insert an image
  - (iv) To highlight some text
  - (v) To insert a hyperlink
6. (a) Write an HTML code to generate the following output : 5

1	2	
	3	
4		
5	6	7

- (b) What is use of an HTML Form? Explain the use and syntax `<INPUT Text>` command with attributes. 2+3

7. (a) What is a hyperlink ? How do you create links to :

1+2+2

(i) a local file, and

(ii) another web page.

(b) What is use of functions in JavaScript ? Explain with an example.

2+3

8. Briefly explain the following :

2×5=10

(i) Browser

(ii) CSS

(iii) JavaScript data types

(iv) Ordered List in HTML

(v) Voice over IP.



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***This question paper contains 4 printed pages.***

*Your Roll No. ....*

***Sl. No. of Ques. Paper: 5215*** **H**  
***Unique Paper Code : 234553***  
***Name of Paper : Internet Technologies – I***  
***Name of Course : B.A. (Prog.)***  
***Semester : V***  
***Duration : 3 hours***  
***Maximum Marks : 45***

***(Write your Roll No. on the top immediately  
on receipt of this question paper.)***

***Question No. 1 is compulsory.***

***Attempt any three questions from Q. Nos. 2 to 6.***

1. (a) What are Empty tags in HTML? Name any two. 2
- (b) Write HTML code to open a link in a new browser window. 2
- (c) What are the uses of “onblur” and “onfocus” events? 2
- (d) Which HTML tag is used to specify footer for a document or section? 1
- (e) Explain the logical operators in JavaScript with example. 3
- (f) Write HTML statement to accept Password from the user. 3
- (g) Write HTML code to insert an image in the background. 1

P. T. O.

(h) Differentiate between Subscript text and Superscript text with example.

2. (a) Write HTML code:

Menu	Frames Logo
<u>Introduction</u> <u>Courses</u> <u>Facilities</u> <u>Faculty</u>	Target window for menu links

(b) Create an HTML form:

## User Input Form

**Personal Particular**

**Name:** \_\_\_\_\_

**Password:** \_\_\_\_\_

**Gender:**  Male  Female

**Age:** < 1 year old

**Languages**

Java  C/C++  C#

**Instruction**

Enter your instruction here...

3. (a) Create a table in HTML as given below: 8

X	Y	Z				
A	B	<table border="1"> <tr> <td>D</td> <td>E</td> </tr> <tr> <td>F</td> <td>G</td> </tr> </table>	D	E	F	G
D	E					
F	G					

- (b) Explain any *two* data types in JavaScript. 2

4. (a) Give the output of the following: 4

(i) `Math.max(100, 120, 50, 29, -80, -40);`

(ii) `Math.pow(6, 3);`

(iii) `Math.floor(14.9);`

(iv) `var txt="UNIVERSITY OF DELHI";`  
`var sln=txt.length;`

- (b) Write a program in JavaScript to find the factorial of a number. 6

5. Write the HTML code to generate a Web Page in the format given below: 10

Consider the following while writing the HTML code:

- (i) Title of the page should be "Hospitality Industry"  
(ii) Background colour of the page should be "Silver",  
Link colour should be "Maroon", visited link  
colour should be "Red".  
(iii) Picture used in the page is the file "beach.jpg"  
(iv) Table should have a border of width 2.

(v) Use the concept of nested lists for creating the list given in the web page with specified bullets.

(vi) Pages linked to:

- Front Office as "front.html"
- Food & Beverages as "food.html"

## Hospitality Industry

One of the industries which is on the path of rapid growth is the hospitality industry.



Hotels are broadly classified as:

Hotels	Resorts
Business Hotels	Beach resorts
Licuro Hotels	Hill resorts
Budget Hotels	Heritage resorts

**Departments in a Hotel**

1. Front Office

- Reservations
- Reception
- Guest relations

2. Food and Beverages

- Room Service
- Coffee Shop
- Restaurant

For all further enquires : Contact us

6. (a) Differentiate between While and Do While loop in JavaScript. 4
- (b) Explain "With" in JavaScript with example. 2
- (c) What is external Style Sheet? How to link it with HTML page? 4

[This question paper contains 8 printed pages]

**Your Roll No.** : .....

**Sl. No. of Q. Paper** : **7284**

Unique Paper Code : 32345102

Name of the Course : **Computer Science :  
Generic Elective for  
Honours**

Name/Title of the Paper: (G) Introduction to  
Programming

Semester : I

**Time : 3 Hours**

**Maximum Marks : 75**

**Instructions for Candidates :**

- (a) Write your Roll No. on the top immediately on receipt of this question paper.
- (b) Question **No. 1** is compulsory.
- (c) Attempt any **FIVE** questions out of **Q2** to **Q8**.
- (d) Parts of a question must be answered together.

(Note: Please ignore any differences in font used for single and double quotes in the Question paper)

P.T.O.

1. (a) What would the following expressions evaluate to : 5

(i)  $4 + 5 * 6 + 2$

(ii)  $(21 == 22) ? 5 : 6$

(iii)  $5 + 7 \% 2$

(iv)  $12 \% 3$

(v)  $1 \& 0$

(b) What would be the output of the following C++ code snippets :  $2 \times 3 = 6$

(i) 

```
for(int i=1; i<=20; i++)
    if (i % 2==0) cout << i << " ";
```

(ii) 

```
for (int i=1; ; )
{
    cout << i << " ";
    if (i == 64)
        break;
    i*=2;
}
```

(iii) 

```
char ch = 'e';
switch(ch)
{
```

case 'a' :

```
case 'e' :
```

```
case 'i' :
```

```
case 'o' :
```

```
case 'u' : cout << " Vowel " << endl;
```

```
default: cout << " Consonant " << endl;
```

- (c) Rewrite the following code segments with the help of a do-while loop :

2+2=4

```
(i) for (int i=1; i <=20; ++i)
      cout << "\n" << i;
```

```
(ii) char ch= 'y' ;
      int i=1;
      while (ch == 'y')
```

```
{
```

```
    cout << i*i*i ;
```

```
    cout << "Pls Enter y if you
    wish to continue." ;
```

```
    i++;
```

```
    cin >> ch ;
```

```
}
```

- (d) Write a C++ program to read twenty-five numbers into an array and display the number of positive and number of negative integers.

5

- (e) Write a C++ program to read the marks obtained by a student in five different subjects, find out the aggregate marks and percentage marks obtained by the student. Assume that the maximum marks that can be obtained by a student in each subject is 100. 5

2. (a) What would be the output of the following C++ programs ? 2+3=5

(i) `int main( )`

```
{
    int num[26], temp ;
    num[0] = 100 ; num[25] = 200 ;
    temp = num [25]; num [25] = num [0];
    num [0] = temp;
    cout << num[0] << " " << num[25] ;
}
```

(ii) `int main( )`

```
{
    int i = 45, c;
    c = check (i);
    cout << c ;
}
```



```

check (int ch)
{
    if (ch >= 45)
        return(100) ;
    else
        return(100 * 100) ;
}

```

- (b) Write a C++ Program to display the following pattern on the output screen. The number of lines should be taken as an input from the user.

5

%%%% @

%%% @ @

%% @ @ @

% @ @ @ @

@ @ @ @ @

- (a) What would be the output of the following C++ program ?

2

```

int main( )

```

```

{

```

```

int a, b ;

a = -3 -- 3 ;

b = ++a + a++ ;

cout << " a = " << a << " b = " << b ;

}

```

- (b) Write a while loop to display the numbers divisible by 3 between 100 and 1000. 4
- (c) Write a C++ function that takes an input parameter x and returns its cube. 4
4. (a) Declare a class Cuboid in C++ having three data members: length, width and height. 2
- (i) Define a default constructor for this class. 1
- (ii) Create an object of this class and display its volume. 2
- (b) Write a C++ function sum Series that accepts two inputs x and n, and finds the sum of first n terms of series : 5

$$1 - \frac{x}{3} + \frac{x}{5} - \frac{x}{7} + \dots$$

5. (a) Suggest an appropriate data type for the following : 4

- (i) Circumference of a circle
- (ii) The number of wheels in a vehicle
- (iii) Designation of a person
- (iv) PAN number like AAHPG4523G of a person

(b) Declare a structure containing cricketer's Id Number, his age, number of test matches that he has played and the average runs that he has scored in each test match. Write a program that accepts as input the information of one such cricketer and displays it. 6

6. (a) Find out the error in the following C++ statements : 4

- (i) `char ch = "temp" ;`
- (ii) `int line count =2 ;`
- (iii) `cout << "a =" << a << "b ="b ;`
- (iv) `int b == 3;`

(b) Write a function in C++ that takes a number as input and returns the sum of its digits. 6

7. (a) Give one example of each of the single line and multiple line Comments. 2

- (b) Which keywords are used to perform the following functions in C++ :
- (i) Exit from the current iteration of loop
  - (ii) Exit from the program
- (c) Write a function called **largestNum( )** that finds the largest number from an array of 10 integers.
8. (a) Write logical expressions to represent each of the following conditions :
- (i) **score** is greater than 60 but less than or equal to 70
  - (ii) **ch** is either lowercase or uppercase letter 'y'
  - (iii) **n** is an odd number between 0 and 9
  - (iv) **x** is a vowel
- (b) Why is **iostream** file required in a C++ program ? Give the syntax for the usage of this file in a C++ program.
- (c) Write a C++ function to check whether a given number is an Armstrong number. An Armstrong number is a number the sum of cubes of whose digits is equal to the number itself.
- (For example, 135 is an Armstrong number as  $135 = 1^3 + 3^3 + 5^3$ )

This question paper contains 4 printed pages]

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S. No. of Question Paper : 7414

Unique Paper Code : 32345301

HC

Name of the Paper : Computer Networks and Internet  
Technologies

Name of the Course : Computer Science : Generic Elective  
for Honours

Semester : III

Duration : 3 Hours

Maximum Marks : 75

(Write your Roll No. on the top immediately on receipt of this question paper.)

Part A is of 25 marks and is compulsory.

Attempt any five questions from Part B.

### PART A

1. (a) Write the code to create the following structure in HTML : 2

$$x^2 + y + z^3 = 2$$

- (b) Explain URL with example. 4

P.T.O.

- (c) Differentiate between the following : 4
- (i) Online and offline in terms of Internet.
  - (ii) Web page and Home page.
- (d) What are GEO satellites ? 2
- (e) What is hyperlink ? 1
- (f) How to insert picture as a background on a web page ? 2
- (g) Write the HTML tags and attributes to insert and align two pictures one at the left and other at the right of the web page. 4
- (h) Give any *three* attributes of FONT tag. 3
- (i) Differentiate between LAN, WAN and MAN. 3

**PART B**

2. (a) Explain the characteristics of Data communication. 5
- (b) Describe the functions of any *five* layers of OSI model. 5
3. (a) Explain the following HTML tags with examples : 5

<BIG>, <SUP>, <U>, <SUB>, <BLINK>

- (b) Create a table in HTML using the following format. The name of the image file "abc.jpg" 5

Bed	Chair	Table	Sofa
2000	250	200	1000
XYZ Furnishings		Image	
Delhi			

4. (a) Differentiate between the following. 4
- (i) Radio Waves and Microwaves
- (ii) Coaxial Cable and Optical Fiber.
- (b) Explain any *three* applications of Internet. 6
5. (a) Create HTML document using frames in the given format. 6

<b>NAME OF THE COLLEGE</b>	
<p>HOME</p> <p>DEPARTMENTS</p> <p>COURSES</p> <p>FACULTY</p>	<p>CONTENT OF THE LINKS</p> <p>SHOULD BE DISPLAYED</p> <p>HERE</p>

- (b) Write a program in JavaScript to find out the factorial of a number. 4
6. (a) Explain any *two* network devices. 4
- (b) What are the advantages of the following topologies : 6
- (i) BUS
- (ii) RING
- (iii) STAR
7. Create an examination form in HTML having the following controls : 10
- (i) Text Box
- (ii) Radio buttons
- (iii) Check boxes
- (iv) Reset and Submit buttons.
8. (a) What is alternative text in image mapping ? 2
- (b) What is a marquee ? How is it used in HTML ? 2
- (c) Enter a list of positive numbers terminated by Zero. Find the sum and average of these numbers using JavaScript. 6



0917230

*This question paper contains 3 printed pages.*

Your Roll No. ....

*Sl. No. of Ques. Paper: 8155*

**HC**

*Unique Paper Code : 62345501*

*Name of Paper : IT Fundamentals*

*Name of Course : B.A. (Prog.) : Computer Science :  
GE*

*Semester : V*

*Duration : 3 hours*

*Maximum Marks : 75*

*(Write your Roll No. on the top immediately  
on receipt of this question paper.)*

*Question No. 1 is compulsory.  
Attempt any five from the rest.*

1. (a) Define Foreign Key. 2
- (b) Briefly describe Microwave Transmission. 3
- (c) What is Telnet? Give its applications. 3
- (d) Differentiate between field and record in a table. 3
- (e) What is RAM? 3
- (f) What are the pointing devices? Name any two of them. 3
- (g) Explain different functional groups of System Bus. 3
- (h) Give full forms of the following:

*Turn over*

- (i) GUI
- (ii) EEPROM
- (iii) ALU
- (iv) OMR
- (v) FTP

5

2. (a) Draw a block diagram to illustrate the basic organization of a computer and explain the functions of its different units. 4
- (b) Define the structure of a URL with the help of an example. Explain each part of the URL. 6
3. (a) Explain any *two* functions of an Operating System. 4
- (b) List and describe any *three* guided media used for transmission of data. 6
4. (a) Explain the terms: Download and Web Page. 4
- (b) Describe any *three* Output Devices. 6
5. (a) Give any *two* benefits of DBMS. 4
- (b) List and discuss any *three* internet applications. 6
6. (a) What are registers? Name any *two* registers along with their functionality. 4
- (b) Describe LAN, WAN and MAN. Give an example of each. 6

- (a) What is the relationship between entities in a Database? Describe different types of relationships. 4
- (b) What is Data Communication? Explain the components of Data Communication. 6
- (a) Briefly describe any *two* levels of bandwidth in data communication measurements. 4
- (b) What are different transmission modes? Describe briefly each of them. 6

This question paper contains 6 printed pages.

Your Roll No. .... 72

Sl. No. of Ques. Paper : 7901 HC  
Unique Paper Code : 52413301  
Name of Paper : Cyber Crime and Laws  
Name of Course : SEC for B.Com.  
Semester : III  
Duration : 3 hours  
Maximum Marks : 75

Write your Roll No. on the top immediately  
on receipt of this question paper.)

(इस प्रश्न-पत्र के मिलते ही ऊपर दिये गये निर्धारित स्थान पर  
अपना अनुक्रमांक लिखिये।)

NOTE :- Answers may be written either in English or in Hindi;  
but the same medium should be used throughout  
the paper.

टिप्पणी : इस प्रश्न-पत्र का उत्तर अंग्रेजी या हिन्दी किसी एक भाषा  
में दीजिये; लेकिन सभी उत्तरों का माध्यम एक ही होना  
चाहिए।

Attempt all questions.

All questions carry equal marks.

सभी प्रश्नों के उत्तर दीजिए।

सभी प्रश्नों के अंक समान हैं।

1. (a) What is 'Cyber Crime'? What are the various modes  
and manners of committing cybercrimes?

P.T.O.

साइबर अपराध क्या होता है? साइबर अपराधों को करने के विभिन्न तरीकों और रीतियों का वर्णन कीजिए। 9

(b) Distinguish between Trademarks and Domain Names.

ट्रेडमार्क और डोमेन नामों में क्या अन्तर है? 6

Or (अथवा)

(a) Define the term 'Domain Name'. What are the different types of disputes with respect to domain name?

'डोमेन नाम' पद की परिभाषा दीजिए। डोमेन नाम से संबंधित विभिन्न प्रकार के विवाद कौन से हैं? 9

(b) How is Conventional Crime different from Cyber Crime?

परम्परागत अपराध किस प्रकार साइबर अपराध से भिन्न होता है? 6

2. (a) What are the various advantages and disadvantages of using the internet?

इंटरनेट के प्रयोग के विभिन्न लाभों और हानियों को बताइए। 9

(b) What are the 'e-forms'? Describe the advantages of using e-forms.

ई-फॉर्मों से आप क्या समझते हैं? ई-फॉर्मों का प्रयोग करने के लाभों का वर्णन कीजिए। 6

Or (अथवा)

(a) Describe the term 'e-contract'. What are the essentials of e-contract?

ई-संविदा शब्द का वर्णन कीजिए। ई-संविदा की अनिवार्य बातें क्या हैं? 9

(b) What is 'Internet Governance'? Who governs the internet?

इन्टरनेट गवर्नेन्स क्या होता है? इन्टरनेट को कौन नियन्त्रित करता है? 6

3. (a) Discuss the provisions for attribution and dispatch of 'Electronic Records'.

इलैक्ट्रॉनिक रिकार्डों के एट्रीब्यूशन और भेजने के लिए व्यवस्थाओं की विवेचना कीजिए। 9

(b) Write short notes on the following:

निम्नलिखित पर संक्षिप्त टिप्पणियाँ लिखिए:

(i) E-Governance

ई-गवर्नेन्स

(ii) Key pair.

की-पेयर। 6

Or (अथवा)

(a) What are the provisions related to authentication of electronic records by affixing digital signature under the IT Act?

IT अधिनियम के अंतर्गत, डिजिटल हस्ताक्षर का इस्तेमाल करके इलैक्ट्रॉनिक रिकार्डों के प्रमाणीकरण से संबंधित व्यवस्थाएँ क्या हैं?

9

(b) What are the provisions related with the manner in which acknowledgement of receipt of an electronic record by different modes shall be made under the IT Act?

IT अधिनियम के अंतर्गत विभिन्न विधियों से इलैक्ट्रॉनिक रिकार्डों की रसीद की अभिस्वीकृति से संबंधित व्यवस्थाएँ क्या हैं?

6

4. (a) (i) The Appellate Tribunal has the same powers as a Civil Court but an aggrieved party may appeal to the High Court.

अपीली प्राधिकरण के पास सिविल न्यायालय जैसी कुछ शक्तियाँ होती हैं परन्तु व्यथित पार्टी उच्च न्यायालय में अपील कर सकती है।

(ii) Distinguish between 'Cyber contraventions' and 'Cyber offences'.

साइबर उल्लंघनों और साइबर अपराधों के बीच अंतर बताइये।

9

(b) Describe the meaning and punishment for cyber terrorism under section 66F of IT Act.

IT अधिनियम की धारा 66F के अंतर्गत साइबर आतंकवाद का अर्थ और दंड का वर्णन कीजिए। 6

Or (अथवा)

(a) How is a Controller of Certifying Authority appointed? What are his functions under the IT Act, 2000?

सत्यापन प्राधिकार के नियंत्रक की नियुक्ति कैसे की जाती है?

IT अधिनियम, 2000 के अंतर्गत उसके क्या कार्य होते हैं ? 9

(b) Briefly discuss meaning and punishment for publishing or transmitting obscene material in electronic form.

इलेक्ट्रॉनिक रूप में अश्लील सामग्री छापने या संचरित करने के अर्थ और इसके लिए दंड की संक्षेप में विवेचना कीजिए। 6

5. (a) What do you mean by intellectual property? Briefly discuss the various types of intellectual property.

बौद्धिक संपत्ति से आप क्या समझते हैं? संक्षेप में विभिन्न प्रकार की बौद्धिक संपत्तियों की विवेचना कीजिए। 9

(b) What do you understand by 'Digital Signature Certificate' as per the IT Act, 2000? What purpose does this certificate serve?

IT अधिनियम, 2000 के अनुसार 'डिजिटल हस्ताक्षर प्रमाणपत्र' से आप क्या समझते हैं? यह प्रमाणपत्र किस उद्देश्य की पूर्ति करता है? 6

Or (अथवा)

(a) Discuss the role of "Certifying Authority" as per the Information Technology Act, 2000.



सूचना प्रौद्योगिकी अधिनियम, 2000 के अनुसार 'सत्यापन अधिकारी' की भूमिका की विवेचना कीजिए। 9

(b) What do you understand by the term 'Copyright'? Explain the provisions relating to copyright infringement.

कॉपीराइट से आप क्या समझते हैं? कॉपीराइट के अतिलंघन से संबंधित व्यवस्थाओं की व्याख्या कीजिए। 6

[This question paper contains 6 printed pages.]

Your Roll No.....

No. of Question Paper : 8029

HC

Unique Paper Code : 62413324

Name of the Paper : Cyber Crimes and Laws

Name of the Course : B.A. (Prog.) : SEC

Semester : III

Duration : 3 Hours

Maximum Marks : 75

**Instructions for Candidates**

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Answers may be written either in English or Hindi; but the same medium should be used throughout the paper.

**छात्रों के लिए निर्देश**

1. इस प्रश्न-पत्र के मिलते ही ऊपर दिए गए निर्धारित स्थान पर अपना अनुक्रमांक लिखिए ।
2. इस प्रश्न-पत्र का उत्तर अंग्रेजी या हिंदी किसी एक भाषा में दीजिए, लेकिन सभी उत्तरों का माध्यम एक ही होना चाहिए ।

1. (a) Explain the different types of domain name disputes.  
How can these disputes be resolved? (9)

(b) Describe the various reasons for growing cyber crimes. (6)

**OR**

(a) Define and compare the two terms 'Trade Marks' and 'Domain Names'. (9)

(b) What is ICANN? (6)

(अ) पोर्टल (Domain) नाम के विवादों के प्रकार बताइये। विवादों का समाधान कैसे किया जाता है ?

(ब) बढ़ते हुए साइबर अपराधों के विभिन्न कारणों पर प्रकाश डालिये।

**अथवा**

(अ) ट्रेडमार्क और पोर्टल नामों (Domain names) की परिभाषा और अन्तर कीजिए।

(ब) ICANN क्या है ?

2. (a) Describe the term 'e-contract'. What are essentials of e-contract? (9)

(b) What are various applications of the internet? (6)

**OR**

(a) Differentiate between :

(i) Computer and Computer Network

(ii) Encryption and Decryption

(9)

(b) "The IT Act is not applicable to some specific documents." Comment.

(6)

(अ) इ-अनुबंधों का वर्णन कीजिए। ई-अनुबंधों के आवश्यक तत्व क्या हैं ?

(ब) इन्टरनेट के विभिन्न उपयोग क्या है ?

अथवा

(अ) अन्तर कीजिए :

(i) कम्प्यूटर और कम्प्यूटर नेटवर्क

(ii) एनक्रिप्शन और डिक्लिप्शन

(ब) "IT अधिनियम कुछ विशिष्ट दस्तावेजों पर लागू नहीं होता" समीक्षा कीजिए।

3. Discuss the provisions for Attribution, Acknowledgment and despatch of Electronic records. (15)

OR

Explain the meaning and uses of digital signature. Describe the steps for creation and verification of digital signature. (15)

इलेक्ट्रॉनिक अभिलेख के गुण, रसीद प्राप्ति और प्रेषित के प्रावधानों का वर्णन करिये ।

अथवा

डिजीटल हस्ताक्षर का अर्थ और उपयोग बताएं । डिजीटल हस्ताक्षर के सत्यापन और रचना के लिए कदमों का वर्णन कीजिए ।

4. (a) What constitutes damage to computer or computer system or computer network? State the penalties prescribed in this regard under the Information Technology Act 2000. (9)
- (b) Discuss the provisions of the Information Technology Act with regard to
- (i) Tampering with computer source documents.
- (ii) Cheating by personating by using computer resource? (6)

OR

- (a) How is a Controller of Certifying Authority appointed? What are his functions under the IT Act, 2000. (9)
- (b) Write a short note on 'Adjudicating officer'. (6)

- (अ) कम्प्यूटर या कम्प्यूटर तंत्र या कम्प्यूटर नेटवर्क में टूटफूट (Damage) क्या है ? IT अधिनियम 2000 के अधीन इस पर दंड प्रस्तावित किये हैं का वर्णन करिये ।
- (ब) IT अधिनियम के अनुसार निम्नलिखित से सम्बन्धित प्रावधान बताइये :
- (i) कम्प्यूटर स्रोत दस्तावेजों के साथ छेड़ छाड़
  - (ii) कम्प्यूटर संसाधन से व्यक्तिकरण का धोखा

अथवा

- (अ) प्रमाण अधिकारिता का नियन्त्रक कौरी नियुक्त किया जाता है ? IT अधिनियम, 2000 के अधीन उसके क्या क्रियाकलाप हैं ?
- (ब) न्यायनिर्णय (Adjudicating) अधिकारी पर एक लघु टिप्पणी कीजिए ।

5. (a) Explain provisions as to how a digital signature certificate can be suspended and revoked. (9)

(b) Explain the following terms :

(i) Cyber stalking

(ii) Trafficking

(6)

OR

(a) Which are the different categories of cyber crimes? Specify examples. Is infringement of copyright an offence? Explain. (9)

(b) Which duties are required to be performed by a subscriber under the IT Act? (6)

(अ) कैसे डिजीटल हस्ताक्षर प्रमाणपत्र का निलंबन या तोड़ा जाता है का वर्णन कीजिए ।

(ब) निम्नलिखित शब्दों का वर्णन कीजिए :

(i) साइबर पीछा करना

(ii) मानव व्यापार (Trafficking)

अथवा

(अ) साइबर अपराधों के विभिन्न प्रकार क्या हैं ? सोदाहरण बताइये । क्या कॉपी राइट का उल्लंघन एक अपराध की श्रेणी में आता है । वर्णन कीजिए ।

(ब) IT अधिनियम के अधीन एक उपभोक्ता द्वारा निष्पादित कर्तव्य क्या हैं ?

[This question paper contains 4 printed pages.]

Your Roll No.....

No. of Question Paper : 8105

HC

Unique Paper Code : 62343501

Name of the Paper : Introduction to Linux

Name of the Course : **B.A. Programme : Computer Application : SEC**

Semester : V

Duration : 2 Hours

Maximum Marks : 25

### Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Section A is compulsory **one** mark each.
3. Attempt any **3** questions out of **5** questions from Section B.

### SECTION A

1. Which command is used to list all the files in the current directory (including hidden files) ?

(A) `ls -l`

(C) `ls -t`

(B) `ls -a`

(D) `ls -i`

P.T.O.



2. Which component of Linux works as a command interpreter?
- (A) Device driver                      (C) Kernel  
(B) Shell                                  (D) CPU
3. Which command is used to display the contents of a file?
- (A) ls                                      (C) cat  
(B) grep                                  (D) dir
4. Which command is used to find the number of connections are currently being used by user "root"?
- (A) `who|grep root|wc -l`      (C) `who > grep root|wc -l`  
(B) `who|grep root>wc -l`      (D) `grep >/dev/null|wc -l`
5. A user executes the following command successfully: `chmod + x file1.txt`. What does this command do?
- (A) The command results in adding execute permission to the user who ran this command.  
(B) The command results in adding execute permission for the owner of the file.  
(C) The command results in an error since the file is not an executable file.

105  
nd  
(D) The command results in adding execute permission for all users (i.e., user, group & others).

6. Which command is used see the list of users who are currently logged-in ?

- (A) login (C) users  
(B) who (D) which

7. Which key combination is used to restart the system ?

- (A) Ctrl+Alt+Del (C) Ctrl+Del  
(B) Alt+Del (D) Ctrl+Shift+Del

8. Which of the following is not a communication command ?

- (A) grep (C) mail  
(B) mesg (D) write

9. Which of the following signals end of the input file ?

- (A) ctrl + a (C) ctrl + b  
(B) ctrl + c (D) ctrl + d

10. What is the result of the command "cat > abc", if the requested file does not exist ?

- (a) File "abc" is created in current directory
- (b) Command prompt is displayed
- (c) Error is reported
- (d) File "abc" is created in parent directory

### SECTION B

1. Write the steps to run Linux on a virtual machine. (5)
2. List five Linux distributions. Write short note on any one. (5)
3. How are processes managed in a Linux operating system? (5)
4. What is the difference between user, owner and group with respect to file permissions in Linux? (5)
5. What is the function of the following commands in Linux?
  - (a) sort
  - (b) tail
  - (c) find
  - (d) apt-get
  - (e) nano

*This question paper contains 4 printed pages.*

Your Roll No. ....

Sl. No. of Ques. Paper: 8106

HC

Unique Paper Code : 62343502

Name of Paper : Open Source Software

Name of Course : B.A. (Prog.) Computer  
Applications : SEC

Semester : V

Duration : 2 hours

Maximum Marks : 25

*(Write your Roll No. on the top immediately  
on receipt of this question paper.)*

*Question No. 1 is compulsory.*

*Attempt any three questions from rest of the five.*

1. (a) The variables which do not change value during execution of programs are defined as:
  - (i) Numeric
  - (ii) String
  - (iii) Constant
  - (iv) Float
- (b) — is a method which moves focus to the specified control or form.
  - (i) Setfocus
  - (ii) Lostfocus
  - (iii) Getfocus

P.T.O.

- (iv) Blur
- (c) The default property of a textbox control is
  - (i) Enable
  - (ii) Text
  - (iii) Multiline
  - (iv) Password char
- (d) — is a collection of files.
  - (i) Class
  - (ii) Group
  - (iii) Project
  - (iv) Form
- (e) The method which loads the form into memory and displays it on screen is —
  - (i) Load
  - (ii) Show
  - (iii) Display
  - (iv) Open
- (f) Which tool lets you select a freehand border and uses edge-recognition algorithms to better fit the border around the object?
  - (i) Select Tool
  - (ii) Intelligent Select Tool
  - (iii) Intelligent Scissors Select Tool

(iv) Scissors Select Tool

(g) What is the shortcut key combination in GIMP, to rotate an image?

(i) Shift+F

(ii) Shift+C

(iii) Shift+T

(iv) Shift+R

(h) What does the character 'G' expand to, in GIMP?

(i) Grep

(ii) General

(iii) Generic

(iv) GNU

(i) What is the shortcut key combination in GIMP, to scale an image?

(i) Shift+C

(ii) Shift+T

(iii) Shift+F

(iv) Shift+R

(j) What does color channel represent?

(i) Dullness

(ii) Color

(iii) Opacity

(iv) Brightness.

10×1=10

R.T.O.

2. (a) Give three advantages of open source.  
(b) Under what conditions is commercial open source software allowed?
3. (a) Define the term Copyright.  
(b) What do you understand by Patent?
4. (a) Give any *three* warranties that may or may not be a part of open source definition.  
(b) Which warranty must be a part of the open source license?
5. (a) Give any two points which make GNU GPL different from the Apache License.  
(b) Name the license given by a company which has developed a popular web browser. Does this license allow commercial use of open source software?
6. (a) Define the term 'work for hire'.  
(b) What do you understand by 'fair use' of software?

[This question paper contains 7 printed pages]

**Your Roll No.** : .....

**Sl. No. of Q. Paper** : **8013** **HC**

Unique Paper Code : 62343318

Name of the Course : **B.A. (Programme) Skill Enhancement Course**

Name of the Paper : Office Automation  
Tools

Semester : III

**Time : 2 Hours** **Maximum Marks : 25**

**Instructions for Candidates :**

- (a) Write your Roll No. on the top immediately on receipt of this question paper.
- (b) Question No. **1** is compulsory. Attempt any **three** questions for rest of the **five**.

1. (i) A character that is raised and smaller above the baseline is known as :

1×10=10

- (a) outlined
- (b) raised
- (c) superscript
- (d) subscript

P.T.O.



(ii) Borders can be applied to :

- (a) cells
- (b) paragraph
- (c) text
- (d) All of above

(iii) Bold, Italic, Regular are known as :

- (a) font styles
- (b) font effects
- (c) word art
- (d) text effects

(iv) How do you delete a column in EXCEL ?

- (a) Select the column heading you want to delete and select the Delete Row button on the standard toolbar
- (b) Select the column heading you want to delete and select Insert Delete from the menu
- (c) Select the row heading you want to delete and select Edit > Delete from the menu
- (d) Right click the column heading you want to delete and select delete from the shortcut menu

- (v) To create a formula in EXCEL, you first :
- (a) Select the cell you want to place the formula into
  - (b) Type the equal sign (=) to tell Excel that you're about to enter a formula
  - (c) Enter the formula using any input values and the appropriate mathematical operators that make up your formula
  - (d) Choose the new from the file menu
- (vi) How to enter \$ 1,000.00 in a cell ?
- (a) Select Format > Money from the menu
  - (b) Click the Currency button on the formatting toolbar
  - (c) You have to retype everything and manually add the dollar signs, commas and decimals
  - (d) None of these
- (vii) What feature will you use to apply motion effects in between a slide exits and another enters ?
- (a) Slide Transition
  - (b) Slide Design
  - (c) Slide Show
  - (d) Animation Scheme

8013

(viii) Which of the following is not entered correctly ?

(a) = 90 + 50

(b) = A7\* A1

(c) = B7 + 145

(d) 40+50

(ix) Which of the following method can insert a new slide in current presentation ?

(a) Right click on the Slide panel and choose New Slide

(b) From Insert menu choose New Slide

(c) Click on New Slide button on toolbar

(d) All of above

(x) To start slide show of a presentation :

(a) Hit F5 key

(b) From Slide Show menu choose View Show option

(c) From Slide Show menu choose Rehearse timing

(d) both a & b

2. (a) What do you understand by Mail Merge ?  
Write the steps to create Mail Merge using MS Word.

3

(b) Write the different steps for Word to write the text in the given format. label then 2 columnar text, then label and then 3 columnar text. 2

3. (a) Differentiate between Sumif () and Sum() functions in terms of syntax and purpose in EXCEL. 2

(b) Explain the Pivot Table and its use in EXCEL. 3

4. (a) You are given the following payroll Information of ABC Ltd. in an Excel Worksheet format : 2×2

<b>Column</b>	<b>Type of Information</b>
B	Name of Employee
C	Designation of Employee
D	Category of Employee
E	Whether HRA is Payable or not
F	Basic Salary
G	Dearness Pay (DP) (50% of Basic Salary)

The Dearness Allowance (DA) is payable at the following rates :

<b>For Basic Salary</b>	<b>Rate of DA as a % of (Basic Salary)</b>
Upto Rs. 20,000/-	50%
Above Rs. 10,000/-	25% (Subject to a condition that minimum DA is Rs. 7,500/-)

The HRA is Payable @ 30% of (Basic Salary) to all those having "Yes" in Column E

The Traveling Allowance (TA) is payable on the following bases :

<b>Category</b>	<b>TA Payable</b>
X	800
Y	600
Z	400
Any other	100

Write a suitable formula to compute any two of the following :

(i) Amount of DA payable in column H

(ii) Amount of HRA Payable in Column K

(iii) Amount of TA Payable in Column M

(b) What is VLOOKUP() function in EXCEL ?

1

5. (a) Write the steps to take the printouts of the handouts in PowerPoint. 3

(b) What do you understand by slide sorter view in PowerPoint ? 2

6. (a) Differentiate between Open Office and MS Office 2

(b) What is Custom Slide Show ? What is the use of it ? Write the steps for the same. 3

( 2 )

(c) Give the output in each case :

(i) `print(1.0 + 2)`(ii) `print(1.0 + float(2))`

```
(iii) s = "goodmorning"
c = set(s)
print ("After converting string to set : "),
print (c)
c = list(s)
print ("After converting string to list :"),
print (c)
```

(d) What will be the output on execution of the following code segment ?

4

```
(i) class test:
    def __init__(self):
        self.variable = 'hello'
        self.Change(self.variable)
    def Change(self, var):
        var = 'namaste'

obj=test()
print(obj.variable)
```

```
(ii) def moo(x):
    x[0] = ['name']
    x[1] = ['rate']
    return id(x)

q = ['name', 'rate']
print(id(q) == moo(q))
```

(e) Define a function called `minSum`, which takes as an argument a list of lists of numbers  
 list 1 = `[[2, 3, 2, 2], [1, 6, 2, 4], [4, 4, 1, 6]]` and calculates  
 the sum of the values in each of the lists and returns the smallest such sum. [For example,  
 if the argument was `[[1, 4, 0, 2], [2, 5, 1, 3], [3, 6, 2, 4]]` the sums  
 would be 9, 13, and 15, so the value returned should be 9.]

(f) Write a function that finds the sum of the following series for  $n$  terms.  
 $1 + 1/3.0 + 1/5.0 + \dots$

(g) What is the output of the following sequence of statements :

```
list = ['a', 'b', 'c', 'd', 'e', 'f']
list[1:3] = ['x', 'y']
print list
```

2. (a) Write a python function `maximum3(n1, n2, n3)` to find maximum of three numbers. 5

(b) Write a python function to count the number of vowels in a string. 5

3. (a) Write a python function for sorting a list `l1 = [6, 23, 4, 72, 9, 79]` using bubble sort. 5

(b) For each of the following, indicate whether it is a valid python identifier : 3

(i) `N1`

(ii) `N_1`

(iii) `N.1`

(iv) `N-1`

(v) `RateOfIncrease`

(vi) `2Good2BeTrue`

(c) Write the output produced by following code segment : 2

```
x = 3
if 2 > x :
    print 'First'
else :
    print 'Second'
if 2 > x :
    print 'Third'
print 'Fourth'
print 'Fifth'
```



4. (a) Evaluate the following expressions :

(i)  $15 \ \& \ 22$

(ii)  $15 \ | \ 22$

(iii)  $-15 \ \& \ 22$

(iv)  $-15 \ | \ 22$

(v)  $\sim 15$

(vi) `print(4.00/(2.0+2.0))`

(vii)  $X = 2 + 9 * ((3 * 12) - 8) / 10$

(viii) `float(4 + int(2.39) % 2)`

(ix)  $2^{**}(3^{**}2)$

(x)  $(2^{**}3)^{**}2$

(b) What is the output of the following code segment ?

```
(i) class Name:
    def __init__(self, firstName, mi, lastName):
        self.firstName = firstName
        self.mi = mi
        self.lastName = lastName
    firstName = "Sita"
    name = Name(firstName, 'F', "Smith")
    firstName = "Geeta"
    name.lastName = "Mita"
    print(name.firstName, name.lastName)
```

(ii) What is the value of sum after the following code has been executed ?

```
sum = 0
for i in range(0, 18, 3):
    if i % 6 == 0 :
        sum = sum + i
print(sum)
```

5. (a) An outline for a Student class is defined as follows :

```
class Student(object) :
def __init__(self, name, regNum, postGrad) :
self.name = name
self.regNum = regNum
self.postGrad = postGrad
def showStudent(self) :
```

You should assume that the name is a string, the registration number is an integer and the postGrad attribute is a boolean value indicating whether the student is a post-graduate. Provide a complete body for the method showStudent which should display on one line the name, registration number and postgraduate status of the student applied as an argument in the following format.

Name: Ajay Kumar; Reg Number: 12345; Postgrad: no

- (b) Give the output for the following code segment :

```
a = [1, 2, 3]
b = a[:]
print b
```

- (c) What will be the output on execution of the following code ?

```
l=[]
def convert(b):
    if(b==0):
        return 1
    dig=b%2
    l.append(dig)
    convert(b//2)
convert(6)
l.reverse()
for i in l:
    print(i),
```

6. (a) In each case, give the output on execution of the code segment :

(i) a = [1, 2, 3]  
b = a  
b[0] = 5  
print a

```
(ii) a = [1, 2]
      b = [a, 3]
      c=b[:]
      a[0]=7
      b[1] = 8
      print c
```

(b) (i) What is the value of sum after the following code has been executed ? 2+4

```
i = 0
sum = 0
while i < 9:
    if i%4 == 0:
        sum = sum + i
    i = i + 2
print sum
```

(ii) Rewrite the code fragment from part (i) using a for loop without using any break statements and without introducing any more variables.

(a) Write the output that will be produced on execution of the following code segments : 5

```
def test(i, j):
    if(i==0):

        return j
    else:
        return test(i-1, i+j)
print(test(3, 6))
```

(b) Write the output of the following string functions on the given string : 5

```
s='abcdefxyyzxyzxzyy'
1. print(s.islower())
2. print(s.count('xy'))
3. print(s.replace('xy', 'pq'))
4. print(s.find('cd'))
5. print(s.split('x'))
```

8. (a) Illustrate the operation of the sequential search on the following list when the search is made for the number 18. 5

L1: {6, 23, 5, 78, 11, 80, 18, 100}

Also give linear search algorithm.

- (b) Rewrite the following segments using while loop. 5

(i) 

```
total = 0
for count in range(1, 21):
    total += count
print total
```

(ii) 

```
import math
total = 0
for count in range(1, 11, 3):
    total += math.pow(count, 2)
print total
```

*This question paper contains 4 printed pages.*

Your Roll No. ....

Sl. No. of Ques. Paper: 8308

HC

Unique Paper Code : 32347504

Name of Paper : Microprocessors

Name of Course : Computer Science : DSE for  
Hons.

Semester : V

Duration : 3 hours

Maximum Marks : 75

*(Write your Roll No. on the top immediately  
on receipt of this question paper.)*

*Attempt all questions from Section A.  
Attempt any four questions from Section B.  
Attempt all parts of a question together.*

### SECTION A

1. (a) What is the purpose of Carry, Interrupt, Sign and Trap flags? 4
- (b) Suppose that DS=1000H, BX=1200, NUMB=0320H, SI=1500H, SS=2000H, and BP=0600H. Determine the address accessed by following instructions, assuming real mode operation:
- (i) MOV NUMB[SI], EDX
- (ii) MOV CL, NUMB [BX+SI]
- (iii) MOV AL, [BP] 3

- (c) Explain LEA instruction with an example. How is it different from MOV with offset directive? 3
- (d) Give the condition tested for following conditional jump instructions:
- (i) JZ
  - (ii) JA
  - (iii) JLE 3
- (e) Give the functions of the following pins on 8088/8086:
- (i) ALE
  - (ii) READY
  - (iii) INTR 3
- (f) Draw the diagram showing generation of separate memory bank write strobe for even and odd bank of memory for 8086. 4
- (g) Differentiate between isolated I/O and memory mapped I/O. 3
- (h) Give the functions of following dedicated interrupts 8086/8088:
- (i) Type 0
  - (ii) Type 1
  - (iii) Type 2 3
- (i) Define following:
- (i) DMA read transfer
  - (ii) DMA write transfer. 4

- (j) List the differences between 8086 and 8088. 3
- (k) Which pins of 8086 are used for DMA request and acknowledge? 2

### SECTION B

2. (a) Draw the Descriptor format of 80386 and explain. 5
- (b) What do you mean by Program Invisible Registers. Discuss their role in the functioning of microprocessor. 5
3. (a) What do you mean by program memory addressing mode? Describe relative program addressing mode. 4
- (b) Write the functions of the following instructions:
- (i) XLAT
  - (ii) MOVS
  - (iii) BOUND 6
4. (a) Describe the functions of following type JMP instructions:
- (i) Short JMP
  - (ii) NEAR JMP
  - (iii) FAR JMP 6
- (b) Differentiate between software and hardware

interrupts. Explain the steps involved in operation of real mode interrupt. 4

5. (a) Describe mode 1 strobed input operation of 8255 PPI with the help of timing diagrams. 6
- (b) Describe the initialization control words (ICW's) of Programmable Interrupt Controller 8259A. 4
6. (a) Briefly describe the purpose of each T state of 8086 read and write bus cycle. 6
- (b) Describe the register indirect data addressing with an example. 4
7. (a) Give the software commands used to control the operation of DMA 8237. 4
- (b) Why is demultiplexing of buses required in 8086? How is demultiplexing done using ALE pin? Explain. 6



This question paper contains 8+1 printed pages]

Roll No.

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No. of Question Paper : 8447

Unique Paper Code : 32347503

HC

Name of the Paper : Operational Research for Computer  
Science

Name of the Course : Computer Science : DSE for Honours.

Semester : V

Duration : 3 Hours

Maximum Marks : 75

*Write your Roll No. on the top immediately on receipt of this question paper.)*

The question paper consists of two Sections

Section A is compulsory.

Attempt any *four* questions from Section B.

*(All parts of a question must be attempted together)*

### Section A

(a) Solve the following system of linear equations using  
rank method : 5

$$X + 2Y + Z = 6, 2X + Y + 2Z = 6 \text{ and}$$

$$X + Y + Z = 5$$

P.T.O.

- (b) Define a convex set. Show that the following set is convex : 5

$$S = \{(x_1, x_2) : x_1 + x_2 \leq 1, x_1 \geq 0, x_2 \geq 0\}.$$

Is the non-negativity condition essential for the proof ?

- (c) Consider the following Linear Programming Problem : 5

Maximize :

$$Z = 2x_1 + 3x_2$$

Subject to :

$$x_1 + 3x_2 \leq 6$$

$$3x_1 + 2x_2 \leq 6$$

$$x_1, x_2 \geq 0$$

Determine all the basic solutions of the problem, and classify them as feasible and infeasible.

- (d) Explain Duality in LPP. Write the dual of the following LPP : 5

Maximize :

$$Z = 5x_1 + 6x_2$$

Subject to :

$$x_1 + 2x_2 = 5$$

$$-x_1 + 5x_2 \geq 3$$

$$4x_1 + 7x_2 \leq 8$$

$x_1$  unrestricted,  $x_2 \geq 0$ .

- (e) The transportation problem in the following table gives a degenerate basic solution. Suppose that the multipliers associated with this solutions are  $u_1 = 1$ ,  $u_2 = -1$ ,  $v_1 = 2$ ,  $v_2 = 2$  and  $v_3 = 5$  and the unit cost for all (basic and non-basic) zero  $x_{ij}$  variables is given by

$$c_{ij} = i + j\theta, \quad -\infty < \theta < \infty,$$

10			10
	20	20	40

10 20 20

- (i) If a given solution is optimal, determine the associated optimal value of the objective function.
- (ii) Determine the value of  $\theta$  that will guarantee the optimality of the given solution. 5
- (f) The time between arrivals at state revenue office is exponential with mean value 0.05 hour. The office opens at 8.00 am. 5
- (i) Write the exponential distribution that describes the interarrival time.
- (ii) Find the probability that no customer will arrive at the office by 8.15 a.m.

- (iii) What is the average number of arriving customer between 8.10 a.m. and 8.45 a.m.
- (g) Suppose that whether or not it rains today depends on previous weather conditions through last two days. Specifically, suppose that if it has rain for the past two days then it will rain tomorrow with probability 0.7; If it rain today but not yesterday, then it will rain tomorrow with probability 0.5; If it rain yesterday but not today, then it will rain tomorrow with probability 0.4; If it has not rained in the past two days then it will rain tomorrow with probability 0.2. Write the transition probability matrix of the above Markov chain. 5

### Section B

2. John must work at least 20 hours a week to supplement his income while attending school. He has the opportunity to work in two retail stores. In store 1, he can work between 4.5 and 12 hours a week, and in store 2, he is allowed between 5.5 and 10 hours. Both stores pay the same hourly wage. In deciding how many hours to work in each store, John wants to base his decision on work stress. Based on interviews with present employees, John estimates that, on an ascending scale of 1 to 10, the stress factors are 8 and 6 at stores 1 and 2 respectively. Because stress mounts by the hour, he assumes

that the total stress for each store at the end of the week is proportional to the number of hours he works in the store, How many hours should John work in each store ? 10.

- (a) Solve the following Linear Programming Problem using simplex algorithm and comment on the nature of the solution. 5

Maximise :

$$Z = 3x_1 + 9x_2$$

Subject to :

$$x_1 + 4x_2 \leq 8$$

$$x_1 + 2x_2 \leq 4$$

$$x_1, x_2 \geq 0.$$

- (b) Consider the following LPP : 5

Maximize :

$$Z = x_1$$

Subject to :

$$5x_1 + x_2 = 4$$

$$6x_1 + \quad + x_3 = 8$$

$$3x_1 + \quad + x_4 = 3$$

$$x_1, x_2, x_3, x_4 \geq 0.$$

Solve the problem by inspection (do not use Gauss-Jordan row operations), and justify the answers in terms of the basic solutions of the simplex method.

4. Solve the following Linear Programming Problem using M-Charnes method : 10

Minimize :

$$Z = 4x_1 + x_2$$

Subject to :

$$3x_1 + x_2 = 3$$

$$4x_1 + 3x_2 \geq 6$$

$$x_1 + 2x_2 \leq 4$$

$$x_1, x_2 \geq 0$$

5. (a) Define basis of a Vector Space. Show that the vectors  $(1, 1), (1, -1)$  form a basis of  $\mathbb{R}^2$ . 5
- (b) Consider the following linear programming problem : 5

Maximize :

$$Z = 3x_1 + 2x_2 + 5x_3$$

Subject to :

$$x_1 + 2x_2 + x_3 + x_4 = 30$$

$$3x_1 + 2x_3 + x_5 = 60$$

$$x_1 + 4x_2 + x_6 = 20$$

$$x_1, x_2, x_3, x_4, x_5, x_6 \geq 0$$

If is given that  $x_4, x_5, x_6$  are the slack variables, Write the dual of this primal problem. Find the values of the optimal dual variables and check the feasibility of the solution when it is given that the optimal primal basic solution is

$$(x_2, x_3, x_6),$$

Basic variables :

Inverse =

$$\begin{bmatrix} \frac{1}{2} & \frac{-1}{4} & 0 \\ 0 & \frac{1}{2} & 0 \\ -2 & 1 & 1 \end{bmatrix}$$

- (a) A product is manufactured at three factories A, B and C and is supplied to four stores I, II, III and IV. The unit transportation costs are given in the following table. Use Matrix minima method to find the initial basic feasible solution so as to minimize the transportation cost. 5

Factories	Stores				Supply
	I	II	III	IV	
A	10	2	20	11	15
B	12	7	9	20	25
C	4	14	16	18	10
<b>Demand</b>	5	15	15	15	

- (b) JoShop needs to assign 4 jobs to 4 workers. The cost of performing a job (in Rupees) is a function of the

skills of the workers. The following table summarizes the cost of assignment. Worker 1 cannot do Job 3, and worker 3 cannot do job 4.

	Job1	Job2	Job3	Job4
Worker 1	50	50	.....	20
Worker 2	70	40	20	30
Worker 3	90	30	50	.....
Worker 4	70	20	60	70

Suppose that an additional (Fifth) worker becomes available for performing the four jobs at the respective cost of Rs. 60, Rs. 45, Rs. 30 and Rs. 80. Is it economical to replace one of the current four workers with the new one ?

7. (a) Babies are born in sparsely populated state at the rate of one birth every twelve minutes. The time between the births follows an exponential distribution. Find the following :
- (i) Average number of birth per year
- (ii) The probability that no birth will occur in any one day



- (b) Let  $\{X_n, n \geq 0\}$  be a Markov chain having state space  $S = \{1, 2, 3, 4\}$  and tpm (transition probability matrix).

5

$$P = \begin{pmatrix} \frac{1}{3} & \frac{2}{3} & 0 & 0 \\ 1 & 0 & 0 & 0 \\ \frac{1}{2} & 0 & \frac{1}{2} & 0 \\ 0 & 0 & \frac{1}{2} & \frac{1}{2} \end{pmatrix}$$

Prove that the state 1 and 2 are Ergodic.