उत्तर प्रदेश मुक्त विश्वविद्यालय, प्रयागराज।

सत्र् 2020—21

कोर्सकोड : Course Code: **UGCS-01**	कोर्स शीर्षकः– (Course Title) **Computer Fundamental**	अधिकतमअंक : **30** **Maximum Marks : 30**

खण्ड अ अधिकतम अंक : **18**

Section-A **Maximum Marks : 18**

नोट— (Instructions): Section A consists of long answer questions. Answer should be in 800 to 1000 words. Attempt <u>any three questions</u> from this section.

प्रश्न संख्या 1 से 9 तक दीर्घ उत्तरीय प्रश्न है जिनका उत्तर 800 से 1000 शब्दों में लिखना है।

1. Briefly describe what are Special purpose registers and General purpose registers in CPU. Why registers are present in the CPU.
2. Explain the following addressing modes with an example and suggest ause for those addressing modes:
   i. Register Indirect   ii. Auto increment   iii. Indirect address   iv. Base address
   v. Indexed address
3. What is input-output interface? Draw and explain block diagram of input-output interface.
4. Differentiate RISC Vs CISC architecture.
5. What is an instruction format? Explain different types of instruction formats in detail.
6. What is a Decoder? Compare a decoder and a demultiplexer with suitable block diagrams.
7. What are I/O devices? Briefly explain the various type of I/O devices.
8. What is virtual memory? Differentiate between Associative memory Vs interleaved memory.
9. Convert the following decimal numbers to binary and octal numbers
   a) 85.85   b) 105.15

खण्ड ब अधिकतम अंक : **12**

Section –B **Maximum Mark : 12**

नोट— (Instructions): Section B consists of short answer questions. Answer should be in 200 to 300 words. Attempt <u>any four questions</u> from this section.

प्रश्न संख्या 01 से 12 तकघ् उत्तरीय प्रश्न है जिनका उत्तर 200 से 300 शब्दों में लिखना है। इस खंड से किसी भी चार प्रश्नों के उत्तर दें।

1. What is the difference between isolated I/O and memory mapped I/O?
2. Discuss and Differentiate Hardware and Micro-programmed control unit.
3. What is the race around condition? How can it be overcome?
4. Write an assembly language program to print the difference of the squares of 15 and 8 with only one multiplications.
5. Explain Flynn's classification of computers.
6. Explain how concurrency is implemented in SISD?
7. Explain the importance of different addressing modes in computer architecture withsuitable example.
8. Explain in detail the different stages of a RISC pipeline.
9. Explain vector processing. What is the difference between vector processing & pipeline processing?
10. Reduce following Boolean function and then realize the reduced one using NOR gate only.
    a. $X = A (B'+C') (A+D)$
11. Draw the circuit diagram of half adder.
12. Write an assembly language program to compare values of the three variables and print them in descending order as: Largest = %d, Medium = %d, Smallest = %d.

कोर्स कोड : Course Code: **UGCS-03**	कोर्स शीर्षकः– (Course Title) **Introduction to System Software**	अधिकतम अंक : **30** **Maximum Marks : 30**

खण्ड अ   अधिकतम अंक : **18**

Section-A   **Maximum Marks : 18**

नोट– (Instructions): Section A consists of long answer questions. Answer should be in 800 to 1000 words. Attempt <u>any three questions</u> from this section.

प्रश्न संख्या 1 से 9 तक दीर्घ उत्तरीय प्रश्न है जिनका उत्तर 800 से 1000 शब्दों में लिखना है।

1. What are necessary conditions to hold a deadlock in a system? Explain the resource allocation Graph algorithm to deal with deadlock problem. What are the limitations of this approach?
2. What do you mean by operating system? What are the major functions of operating system?
3. Define the following terms :
   a. Dispatchers   b. Scheduling   c. Swapping   d. Context switching
4. What do you mean by Compiler? Discuss the step to design a compiler.
5. What do you mean by system software? Explain in details types of software.
6. How is a process different from a program? What information is contained within a Process Control Block (PCB)?
7. Explain the page fault handling routine in a computer system employing virtual memory.
8. Explain the following Unix commands:
   (a) cp (b) chmod (c) sort (d) vi (e) ls (f) tee
9. What is a Semaphore? Explain the wait and signal operations of a semaphore. Why are these operations atomic?

खण्ड ब   अधिकतम अंक : **12**

Section –B   **Maximum Mark : 12**

नोट– (Instructions): Section B consists of short answer questions. Answer should be in 200 to 300 words. Attempt <u>any four questions</u> from this section.

प्रश्न संख्या 01 से 12 तक लघु उत्तरीय प्रश्न है जिनका उत्तर 200 से 300 शब्दों में लिखना है। इस खंड से किसी भी चार प्रश्नों के उत्तर दें।

1. Discuss the paging system for memory management; also give its advantages and disadvantages.
2. Differentiate between :
   (a) System software and application software
   (b) General purpose OS and real time OS
3. What do you understand by page replacement? Name the algorithm available for page replacement.
4. Write the merits and demerits of Assembly language and High level language.
5. What do you mean by two pass assembler?
6. List the functions of System table.
7. Explain the function of Loader.
8. What do you mean by process? Discuss the different state of a process.
9. What is system cost?
10. What do you mean by Multitasking operating system?
11. Explain the difference between compiler and Interpreter. Write the names of two languages used in compiler and interpreter.
12. What is a scheduler? Explain any two types of schedulers.

कोर्स कोड : Course Code: **UGCS-04**	कोर्स शीर्षकः– (Course Title) **'C' Programming**	अधिकतम अंक : **30** **Maximum Marks : 30**

खण्ड अ   अधिकतम अंक : **18**
Section-A   **Maximum Marks : 18**

नोट– **(Instructions): Section A consists of long answer questions. Answer should be in 800 to 1000 words. Attempt <u>any three questions</u> from this section.**

प्रश्न संख्या **1** से **9** तक दीर्घ उत्तरीय प्रश्न है जिनका उत्तर **800** से **1000** शब्दों में लिखना है।

1. What is an operator? Explain the arithmetic, relational, logical and assignment operators in C.
2. Write a C program to calculate the factorial of a given number.
3. Write a C program to take a year as input and find out whether it is leap year or not.
4. The two matrix A (NXN) and B (NXN) of following numbers are given. Write the program in C language to find the multiplication of the transpose of A and B i.e. AT X BT.
5. What is a structure? Create a suitable structure for storing the information about the Technical Institutions in India (Assume appropriate attributes to store the information). List all the institutes for a given state.
6. What is the advantage of switch statement over if-else statement? Write a program in C using switch statement to find the value of Y for a given value of N between 1 and 4.

if N =1	Y = (ax+b)2
if N = 2	Y = ax2+b3
if N=3	Y= -ax+b
if N=4	Y=a2+x

7. What do you mean by Pointer? Write the algorithm and programming in C to implement selection sorting.
8. Suppose A is a header circular list in memory. Write a program in C which deletes the last node from A.
9. Convert the following infix expression into postfix expression using stack.
   (i)   (a-b*(f+g * h)) * (d/e-f)
   (ii)   (ii) (a + b ↑ d) /(e-f) + g

नोट– **(Instructions): Section B consists of short answer questions. Answer should be in 200 to 300 words. Attempt <u>any four questions</u> from this section.**

प्रश्न संख्या 01 से 12 तक लघु उत्तरीय प्रश्न है जिनका उत्तर 200 से 300 शब्दों में लिखना है। इस खंड से किसी भी चार प्रश्नों के उत्तर दें।

1. Write any two differences between compilers and interpreters.
2. Explain with example the difference between switch case and do-while loop in C.
3. With the help of an example explain how dynamic memory allocation can be done in C.
4. Define array and its types.
5. Write a short note on call by value and call by reference parameter passing method with example.
6. Write the C programme to find out the length of string without using the string function.
7. Write the step to run the C programme in UNIX.
8. What do you mean by union in C?
9. Define searching. Write a program in C to implement a linear search.
10. Write a program in C to check whether a given string is a palindrome or not? Also give the total number of characters in the string.
11. What is Recursive Function? Explain with suitable Example.
12. Discuss about bit-wise operators in C.

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Under Graduate Computer Programme (UGCS)

कोर्सकोड : Course Code: **UGCS-06**	कोर्स शीर्षकः– (Course Title) **DBMS**	अधिकतमअंक : **30** **Maximum Marks : 30**

खण्ड अ   अधिकतम अंक : **18**
Section-A   **Maximum Marks : 18**

नोट– (Instructions): Section A consists of long answer questions. Answer should be in 800 to 1000 words. Attempt <u>any three questions</u> from this section.

प्रश्न संख्या **1** से **9** तक दीर्घ उत्तरीय प्रश्न है जिनका उत्तर **800** से **1000** शब्दों में लिखना है।

1. Construct an E-R diagram for a hospital with a set of patients and a set of medical doctors. Associate with each patient a log of the various tests and examinations conducted.
   (i) Draw an E-R diagram
   (ii) Transform the E-R diagram to a Relational Schema.
2. Explain the following with their advantages and disadvantages.

   a. Distributed database b. Client-server database c. Relational database

3. What is index file? What are the differences between primary index and secondary index? Discuss in detail on B+ tree and B tree index file.
4. What is entity and attribute? Give some examples of entities and attributes in a manufacturing environment. Why are relationships between entities important?
5. What do you mean by data redundancy? What is the difference between controlled redundancy? What is data independence?
6. Suppose you are given the following requirements for a simple database for the National Hockey League (NHL):

- the NHL has many teams,
- each team has a name, a city, a coach, a captain, and a set of players,
- each player belongs to only one team,
- each player has a name, a position (such as left wing or goalie), a skill level, and a set of injury records,
- a team captain is also a player,
- a game is played between two teams (referred to as host_team and guest_team) and has a date (such as May 11th, 1999) and a score (such as 4 to 2).

Construct a clean and concise ER diagram for the NHL database and transform the E-R diagram to a Relational Schema.

7. Consider the following relational schema:

   Suppliers (sid:integer, sname:string, city:string, street:string)

   Parts(pid:integer, pname:string, color:string)

   Catalog(sid:integer, pid:integer, cost:real)

The highest normal form of this relation scheme is? Justify your answer

8. How do RDBMS provide ACID properties (atomicity, consistency, isolation, durability)?
9. The tourism department wishes to computerize its data. The information consists of monuments of tourist interest, their region and history. Monuments are classified according to historical, religious and architecture importance. The list of facilities mailable at each sport is available. These give living accommodation in terms of hotel, their names, category and the number of rooms available and local transport facilities in terms of service provider name, tour with their tariff and timing.
   (i) Draw an E-R diagram.
   (ii) Transform the E-R diagram to a Relational Schema.

खण्ड ब   अधिकतम अंक : 12
Section –B   **Maximum Mark : 12**

नोट– **(Instructions): Section B consists of short answer questions. Answer should be in 200 to 300 words. Attempt <u>any four questions</u> from this section.**

प्रश्न संख्या 01 से 12 तक लघु उत्तरीय प्रश्न है जिनका उत्तर 200 से 300 शब्दों में लिखना है। इस खंड से किसी भी चार प्रश्नों के उत्तर दें।

1. *Given the following set F of functional dependencies for relation schema R = {A, B, C, D, E}. {A -> BC, CD -> E, B -> D, E -> A} List the candidate keys for R.*
2. Write relational algebra queries for the following relation:

   a. Student(ssn, name, address, major)

   b. Course(code, title) Registered(ssn,code)

      a) Names of students and the titles of courses they registered to.

      b) *The titles of courses for which no student is registered.*

3. Discuss on the various ways in which we can arrive at a good database design.

4. Explain 1NF, 2NF and 3NF with an example.
5. Explain how the Boyce-Codd normal form differs from that of 3NF.
6. Explain the various ways in which concurrency control can be implemented in a database.
7. What is data? What do you mean by information? What are the differences between data and information?
8. Who is a DBA? What are the responsibilities of a DBA?
9. The relation schema
   a. Student_Performance (name, courseNo, rollNo, grade)
   b. has the following Fds:
   c. name,courseNo->grade rollNo,courseNo->grade name->rollNorollNo->name
   d. The highest normal form of this relation scheme is?

10. What is a transaction? Which are the properties of a transaction and explain each.
11. What is a database trigger? Which are the different kinds of triggers?
12. The employee information in a company is stored in the relation.

   a. Employee:(<u>name</u>,sex,salary,deptName)
   b. Assuming name is primary key, What is the output of following SQL query?
   c. SELECT deptName FROM Employee WHERE sex='M' GROUP BY deptName
      a) HAVING AVG(salary)> (SELECT AVG(salary) FROM Employee);

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Under Graduate Computer Programme (UGCS)

कोर्स कोड : Course Code: **UGCS-07**	कोर्स शीर्षकः— (Course Title) **System Analysis and Design**	अधिकतम अंक : **30** **Maximum Marks : 30**

खण्ड अ   अधिकतम अंक : **18**
Section-A   **Maximum Marks : 18**

नोट— (Instructions): Section A consists of long answer questions. Answer should be in 800 to 1000 words. Attempt <u>any three questions</u> from this section.

प्रश्न संख्या 1 से 9 तक दीर्घ उत्तरीय प्रश्न है जिनका उत्तर 800 से 1000 शब्दों में लिखना है।

1. What is Risk Management and what will risk management do for any business? How does software risk management related to Software process improvement?
2. Define Software Development life cycle (SDLC). What is spiral model? List the advantage and disadvantage of waterfall model.
3. What is Software Testing? What are the various characteristics of a good testable software?
4. Explain prototype model of software development. Is prototype model a suitable
5. Model for courier company management system? Justify your answer.
6. What is function point analysis? List four features of it.
7. Explain the following:
   a) Project b) Project scheduling c) Critical Path d) Milestones e) Checkpoints f) Project review.
8. What is strategic planning? Relate strategic planning to management control and operational control.
9. With respect to purchasing and inventory control systems explain any three of the following:
   a) Why do retail outlets carry inventory b) Inventory carrying cost. c) Procurement lead time d) Bill of material.

खण्ड ब   अधिकतम अंक : **12**
Section –B   **Maximum Mark : 12**

नोट— (Instructions): Section B consists of short answer questions. Answer should be in 200 to 300 words. Attempt <u>any four questions</u> from this section.

प्रश्न संख्या 01 से 12 तक लघु उत्तरीय प्रश्न है जिनका उत्तर 200 से 300 शब्दों में लिखना है। इस खंड से किसी भी चार प्रश्नों के उत्तर दें।

1. What are the differences between Black Box Testing" and "White Box Testing"?
2. What do you mean by Software Configuration Management?
3. Discuss the role of PERT Chart in software development.
4. What is system analysis? Describe the importance of system analysis in software System development.
5. List any five responsibilities of a System Analyst.
6. What is coupling and Cohesion? What are the different type of Cohesion?
7. Differentiate between decision table and decision tree.
8. What are the attributes of good analyst?
9. Explain the system development life cycle.
10. Distinguish between hierarchical structure and network structure.
11. Define Bench Mark?

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Under Graduate Computer Programme (UGCS)

कोर्स कोड : Course Code: **UGCS-08**	कोर्स शीर्षक:— (Course Title) **Discrete Mathematics**	अधिकतम अंक : **30** **Maximum Marks : 30**

खण्ड अ   अधिकतम अंक : **18**

Section-A   **Maximum Marks : 18**

नोट— (Instructions): Section A consists of long answer questions. Answer should be in 800 to 1000 words. Attempt <u>any three questions</u> from this section.

प्रश्न संख्या 1 से 9 तक दीर्घ उत्तरीय प्रश्न है जिनका उत्तर 800 से 1000 शब्दों में लिखना है।

1. What do you mean by the rank and nullity of a group? Discuss the rank and nullity of a complete graph of n vertices.

2. *In a Boolean algebra [B, +, . , /]* prove that :
   (a) $(a+b)' + (a+b')' = a'$
   (b) $(a+b) . (a'+c) = a'.b + a.c$

3. prove that $nCr = n-1Cr + n-1Cr-1$

4. A relation R on the set A = [1, 2, 3, 4] given by
   R = [(1, 1), (1, 2), (2, 2), (3, 1), (3, 2), (3, 3), (4, 2), (4, 4)]
   Represent it by a digraph and show in-degree and out degree of each vertex.

5. Place that conditional operation distributes over conjunction
   $P => (qVv) \equiv (P => q) V (P => v)$

6. Show that the statement
   $(p \wedge q) => (PVq)$ is a tautology but $(PVq) => (P \wedge q)$ is not a tautology.

7. In a group of 52 persons who drink tea or coffee or both, 16 drink tea but not coffee and 33 drink tea Find how many.
   (i) drink tea and coffee both.
   (ii) drink coffee but not tea.

8. For each of these relations on the set {1, 2, 3, 4}, decide whether it is reflexive, whether it is symmetric, whether it is anti-symmetric, and whether it is transitive.

   a) {(2, 2), (2, 3), (2, 4), (3, 2), (3, 3), (3, 4)}
   b) {(1, 1), (1, 2), (2, 1), (2, 2), (3, 3), (4, 4)}
   c) {(2, 4), (4, 2)}
   d) {(1, 2), (2, 3), (3, 4)}
   e) {(1, 1), (2, 2), (3, 3), (4, 4)}
   f) {(1, 3), (1, 4), (2, 3), (2, 4), (3, 1), (3, 4)}

9. How many bit strings of length 10 contain
   (a) at most four one's
   (b) at least four one's
   (c) exactly four one's.

Section –B   **Maximum Mark : 12**

नोट— **(Instructions): Section B consists of short answer questions. Answer should be in 200 to 300 words. Attempt** <u>any four questions</u> **from this section.**

प्रश्न संख्या 01 से 12 तक लघु उत्तरीय प्रश्न है जिनका उत्तर 200 से 300 शब्दों में लिखना है। इस खंड से किसी भी चार प्रश्नों के उत्तर दें।

1. Find three distinct Hamiltonian cycle in the following graph. Also find their weights.
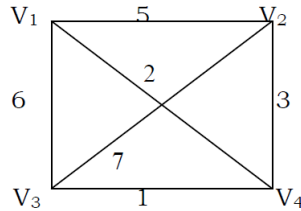
2. Simplify Boolean function f given by:
   $F (A,B,C,D) = \Sigma (0,2,7,8,10,15)$ using Karnaugh map.

3. Solve the recurrence relation $Y_{n+1} - Y_n = n^2$

4. Eight coins are thrown simultaneously. Find the chance of obtaining at least six heads.

5. Given the following statements as premises all referring to an arbitrary meal:
   (a) If he takes coffee, he does not drink milk.
   (b) He eats crackers only if he drink milk.
   (c) He does not take soup unless he eats crackers.
   (d) At noon today, he had coffee.
   Whether he took soup at noon today? If so, what is the correct conclusion?

6. Show that [P ->(q-> r)] [(p -> q) (p -> r)] is a tautology.

7. Explain the concept of Isomorphic Graphs.

8. Define Hamiltonian graph along with its properties.

9. Differentiate between. Euclidian walk and Euclidian circuit.

10. What do you mean by planar graph. Explain the planarity condition in a given Graph.

11. Determine the number of positive integers n where $15 <= n <= 100$ and n is not divisible by 2, 3 or 5.

12. Define tree. Show that in a tree of n vertex will have n-I edges.

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Under Graduate Computer Programme (UGCS)

कोर्स कोड : Course Code: **UGCS-09**	कोर्स शीर्षकः— (Course Title) **Computer Network**	अधिकतम अंक : **30** **Maximum Marks : 30**

खण्ड अ   अधिकतम अंक : **18**

Section-A   **Maximum Marks : 18**

नोट— (Instructions): Section A consists of long answer questions. Answer should be in 800 to 1000 words. Attempt <u>any three questions</u> from this section.

प्रश्न संख्या 1से 9 तक दीर्घ उत्तरीय प्रश्न है जिनका उत्तर 800 से 1000 शब्दों में लिखना है।

1. What do you understand by the term computer network? List the key component of a network.
2. Differentiate between OSI and TCP reference model in terms of layers. Functionality of each layer and important protocols at each layer.
3. Describe the following transmission techniques with examples:
   (i) Simplex   (ii) Half Duplex   (iii) Full Duplex
4. What do we mean by Multiplexing? Explain the three different types of multiplexing techniques.
5. Explain the OSI reference model with the help of a diagram. Give brief description of each layer of the model.
6. Assume message M: 1010101010 bits and generator G: 10001 bits. Explain how CRC is used for error detection using above message bits and generator bits.
7. Explain the working of Link State Routing Algorithm using an example.
8. Compare and contrast between synchronous and asynchronous transmission using an example for each.
9. Why network models are divided into layers? Write the similarities between TCP/IP and OSI model.

खण्ड ब   अधिकतम अंक : **12**

Section –B   **Maximum Mark : 12**

नोट— (Instructions): Section B consists of short answer questions. Answer should be in 200 to 300 words. Attempt <u>any four questions</u> from this section.

प्रश्न संख्या 01 से 12 तक घु उत्तरीय प्रश्न है जिनका उत्तर 200 से 300 शब्दों में लिखना है। इस खंड से किसी भी चार प्रश्नों के उत्तर दें।

1. Explain the format of TCP header through illustration.
2. Explain the advantage of ISDN.
3. What is the need of multiplexing channels?
4. What are the various transmission media available?
5. Differentiate between the packet switching and Circuit Switching.
6. Explain the working of Distance Vector Routing using an example.
7. List the protocols used for host to host communication in the transport layer of TCP/IP model. What are the important differences between these two protocols?
8. Differentiate between mutlicast addressing and Unicast addressing.
9. What is a parity bit? What is it used for? Explain with example.
10. What do we mean by class addressing and class-less addressing? Give the range of IP addresses used in different classes in class addressing mode.
11. Write short notes on the following:
    a. Hub   b. Repeater
12. Give the purpose of layering. How is the minimum size of an Ethernet frame determined?

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कोर्स कोड : Course Code: UGCS-11	कोर्स शीर्षकः— (Course Title) C++ and Object oriented programming	अधिकतम अंक : 30 Maximum Marks : 30

खण्ड अ	अधिकतम अंक : 18
Section-A	**Maximum Marks : 18**

नोट— (Instructions): Section A consists of long answer questions. Answer should be in 800 to 1000 words. Attempt <u>any three questions</u> from this section.

प्रश्न संख्या 1से 9 तक दीर्घ उत्तरीय प्रश्न है जिनका उत्तर 800 से 1000 शब्दों में लिखना है।

1. What is operator overloading? Illustrate Operator overloading concept to concatenate strings.
2. Explain why do we need to use constructors? Explain a copy constructor with an example.
3. What are the different forms of inheritance supported by C++ ? Explain with examples.
4. Highlight the difference between pure virtual functions and virtual function.
5. Write a program using a try block to detect and throw an exception if the condition "divide by zero" occurs.
6. Explain why Object Oriented Programming approach is better than Structured Programming Approach.
7. What is polymorphism? What are different forms of polymorphism? Explain implementation of polymorphism with the help of a C++ program.
8. Explain the usage of the following C++ operators with the help of an example program.
   (a) sizeof operator (b) Logical Operators (c) Scope resolution operator.
9. Declare an abstract class *"Shape"* with methods **'area'** & **'volume'**. Refine this super class to subclasses like *"cone"*, *"cylinder"* & *"Rectangular Box.* Then, Calculate area and volume for the subclasses.

खण्ड ब	अधिकतम अंक : 12
Section –B	**Maximum Mark : 12**

नोट— (Instructions): Section B consists of short answer questions. Answer should be in 200 to 300 words. Attempt <u>any four questions</u> from this section.

प्रश्न संख्या 01 से 12 तक लघु उत्तरीय प्रश्न है जिनका उत्तर 200 से 300 शब्दों में लिखना है। इस खंड से किसी भी चार प्रश्नों के उत्तर दें।

1. What do you mean by "this" function? What are the applications of "this" pointer?
2. What are pure virtual functions?
3. What do you mean by container classes?
4. What is a Use case? Also explain with example.
5. What is reusability? Which things can be reused?
6. What is friend function? How it is implemented in C++ ?
7. What is template? Explain with suitable example.
8. What are different types of inheritance?
9. What is operator overloading?
10. Write C++ program to create Matrix class.
11. List the features of Object oriented programming.
12. What are input and output streams. Explain.

उत्तर प्रदेश मुक्त विश्वविद्यालय, प्रयागराज।

सत्र 2020–21
Under Graduate Computer Programme (UGCS)

कोर्स कोड : Course Code: UGCS-16	कोर्स शीर्षकः– (Course Title) **Statistical Methods**	अधिकतम अंक : 30 **Maximum Marks : 30**

खण्ड अ   अधिकतम अंक : **18**
Section-A   **Maximum Marks : 18**

नोट– **(Instructions): Section A consists of long answer questions. Answer should be in 800 to 1000 words. Attempt <u>any three questions</u> from this section.**

प्रश्न संख्या 1 से 09 तक दीर्घ उत्तरीय प्रश्न है जिनका उत्तर 800 से 1000 शब्दों में लिखना है।

1. Discuss about the Mean Deviation with its merits and demerits. Also show that Mean Deviation is minimum when it is measured about median of the frequency distribution.
2. Discuss about the Geometric Mean with its merits, demerits and Uses. Also define the additive property of Geometric Mean.
3. Define Standard Deviation. Also discuss the effect of Change of origin and scale on it.
4. Discuss about the different methods of diagrammatic representation of statistical data.
5. Discuss about the Arithmetic Mean with its application and merits and demerits. Also prove that the A.M. is not independent of change of origin and scale.
6. Define Variance. State and prove its additive property.
7. Discuss about the Dispersion. Also define its all measures of Dispersion in detail.
8. Prove that the sum of the squares of the deviations of a set of values is minimum when taken about mean.
9. Discuss about the co-efficient of variation. In the following data find which series has less C.V.

Series A	5	9	12	8
Series B	7	12	19	10
C.I	10-20	20-30	30-40	40-50

खण्ड ब   अधिकतम अंक : **12**
Section –B   **Maximum Mark : 12**

नोट– **(Instructions): Section B consists of short answer questions. Answer should be in 200 to 300 words. Attempt <u>any four questions</u> from this section.**

प्रश्न संख्या 01 से 12 तक लघु उत्तरीय प्रश्न है जिनका उत्तर 200 से 300 शब्दों में लिखना है। इस खंड से किसी भी चार प्रश्नों के उत्तर दें।

1. Discuss about the Weighted Mean.
2. What is the difference between multiple bar diagram and divided bar diagram.
3. Define coefficient of variation. For what purpose is it used?
4. Discuss about Histogram.
5. Give short notes on Percentile and Decile.
6. Write a detailed note on the Ogives.
7. Discuss about the Pie Chart and Pictogram.
8. State and prove first property of the mean.
9. Distinguish between Frequency Curve and Frequency Polygon.
10. Write a note on the Mode with its merits, demerits and uses.
11. Show that the median of a variable is the intersection point of ogives.
12. State and prove the additive property of mean.

उत्तर प्रदेश मुक्त विश्वविद्यालय, प्रयागराज।

सत्र 2020—21
Under Graduate Computer Programme (UGCS)

कोर्स कोड : Course Code: UGCS-17	कोर्स शीर्षकः— (Course Title) Operation Research	अधिकतम अंक : **30** **Maximum Marks : 30**

खण्ड अ   अधिकतम अंक : **18**
Section-A   **Maximum Marks : 18**

नोट— **(Instructions): Section A consists of long answer questions. Answer should be in 800 to 1000 words. Attempt <u>any three questions</u> from this section.**

प्रश्न संख्या 1 से 09 तक दीर्घ उत्तरीय प्रश्न है जिनका उत्तर 800 से 1000 शब्दों में लिखना है।

1. Discuss about the Linear Programming Also Define the different steps for Graphical solution to LPP.

2. Discuss about the principle of simplex method. Also define non basic variable and artificial variables.

3. Discuss about the different methods for the computation of an initial basic feasible solution.

4. Write a detailed note on classification of models used in operations research.

5. What is a transportation problem? How could it be considered as LPP? Also, show that number of basic variables in a transportation problem of order m x n, are at the most m+ n -1

6. "Ram can buy young hens at Rs. 150 each and old hens at Rs. 120 each. The old hens lay 3 eggs per week and the young ones lay 5 eggs per week, each egg being worth Rs. 4. If any hen costs Rs. 10 per week to feed and Ram has only Rs. 3600 to spend for hens, how many of each kind should Ram buy to give a profit of more than Rs. 70 per week, assuming that Ram cannot house more than 25 hens." Formulate this problem and solve graphically.

7. Solve the following LPP :

   Max $Z = 5x - 2y + 3z$

   subject to $2x + 2y - z \geq 2$

                  $3x - 4z \leq 3$

                  $y + 3z \leq 3$

   and $x, y, z \geq o$

8. Find the dual of the following primal problem (mention all steps)

   Min $Z = x + y + z$

   subject to $x - 3y + 4z = 5$

                $x - 2y \leq 3$

                $2y - z \geq 4$

          and $x, y, z \geq 0$

9. Explain the following terms.

   (i)   Feasible solution (FS)

   (ii)   Basic solution (BS)

   (iii)   Basic feasible solution (BFS).

   (iv)   Optimum BFS.

नोट— **(Instructions): Section B consists of short answer questions. Answer should be in 200 to 300 words. Attempt <u>any four questions</u> from this section.**

प्रश्न संख्या 01 से 12 तक लघु उत्तरीय प्रश्न है जिनका उत्तर 200 से 300 शब्दों में लिखना है। इस खंड से किसी भी चार प्रश्नों के उत्तर दें।

1. Discuss in brief about the Hungarian method.

2. Discuss about the basic assumption of two person sum- zero game.

3. Write a note on pay off matrix.

4. Describe the graphical method for $2 \times \square$ or $\square \times 2$ games.

5. What is a dual problem? How do we get a dual of given primal?
6. State and prove reduction theorem for assignment problems.
7. Soles the following LPP graphically (give all steps).
   Max . Z = 3 x + 2y, subject to x-y ≤ 1, x+ y ≥ 3 and x , y ≥ o .

8. Write a brief note on phases of OR problem.

9. Give the basic assumptions of Two-Person Sum-Zero Game.

10. Write a brief note a various types of variables used in LPP.

11. Differentiate clearly between primal and its dual problem (with example).

12. What do you mean by LPP? Discuss geometric properties of LPP.