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SEAT No. :

P6789

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[6183]-501

First Year M.C.A. (Engineering)

PROBABILITY & STATISTICS

(2019 Pattern) (Semester - II) (310910)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.***
2) ***Figures to the right side indicate full marks.***
3) ***Assume Suitable data if necessary.***
4) ***Use of probability table, electronic pocket calculator is allowed***

Q1) a) From a group of 7 men and 6 women, five persons are to be selected to form a committee so that at least 3 men are there on the committee. In how many ways can it be done? **[6]**

b) What is Bayes Theorem? Write a Bayes Theorem - Statement, Bayes Theorem Formula for Events. **[6]**

OR

Q2) a) Given that E and F are events such that P(E) = 0.5, P(F) = 0.4 and $P(E \cap F) = 0.3$, then what will be the value of P(F|E)? **[6]**

b) List and Explain Axioms of Probability Every Data Scientist Should Know? **[6]**

Q3) a) Explain Correlation Coefficient Types, Formulas with Examples. **[6]**

b) What are the types of population in statistics? Explain With Example. **[6]**

OR

Q4) a) Lets say we have below heights of persons. **[6]**

heights = [168, 170,150,160,182,140,175,191,152,150] Calculate Mean, Median, Mode, Variance and Standard Deviation.

b) What are the sampling methods or Sampling Technigues? Explain in Detail. **[6]**

Q5) a) How do you find the expected value and standard deviation of a geometric random variable? Explain Formula and Steps to find the expected value. **[6]**

b) What are the three types of random variables? Explain in Detail. **[5]**

OR

P.T.O.

Q6) a) Find the mean and variance of X? **[6]**

x	0	1	2	3	4
F(x)	1/9	2/9	3/9	2/9	1/9

b) What is the Cumulative Distribution Function? Explain Formula for CDF of a discrete random variable. **[5]**

Q7) a) Explain the difference between Probability mass functions (pmf) and Cumulative distribution function for Continuous Random Variable. **[6]**

b) In a popular shopping center, the waiting time for an ABSA ATM machine is found to be uniformly distributed between 1 and 5 minutes. What is the probability of waiting between 2 and 3 minutes to use the ATM? **[6]**

OR

Q8) a) What is the marginal probability density? How do you calculate marginal pdf? Explain Formula and Steps. **[6]**

b) Heights of college women have a distribution that can be approximated by a normal curve with a mean of 65 inches and a standard deviation equal to 3 inches. About what proportion of college women are between 65 and 67 inches tall? **[6]**

Q9) a) What is the difference between a chi-square test for goodness-of-fit and a chi- square test for homogeneity? Explain in Detail. **[6]**

b) What are the steps of hypothesis testing? Explain Five Steps in Hypothesis Testing. **[6]**

OR

Q10)a) What is the p value of the test? How do we calculate p value for two tailed tests? **[6]**

b) Write a note r * c Test for Independence Explain in Detail. **[6]**

Q11)a) What is the need of statistical quality control? Explain Its Limitations and Applications. **[6]**

b) Why are the X bar and R chart used together? Explain R Chart in Detail. **[5]**

OR

Q12)a) The length of time, in hours, it takes an "over 40" group of people to play one soccer match is normally distributed with a mean of 2 hours and a standard deviation of 0.5 hours. A sample of size n = 50 is drawn randomly from the population Find the probability that the sample mean is between 1.8 hours and 2.3 hours. **[6]**

b) What is acceptance sampling? What are its advantages and disadvantages? Explain. **[5]**

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[Total No. of Pages : 2

[6183]-502
First Year.M.C.A. (Engineering)
SYSTEMS PROGRAMMING & OPERATING SYSTEM
(2019 Pattern) (Semester - II) (310911)

Time : 3 Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume Suitable data if necessary.***

Q1) a) Distinguish system program and application program. **[6]**

b) Write a short note on two pass assembler. **[6]**

OR

Q2) a) What are features of MASM? **[6]**

b) Explain advanced assembler directives. **[6]**

Q3) a) Write a short note on MS-DOS linker. **[6]**

b) Describe code optimization techniques. **[6]**

OR

Q4) a) What are the phases of compiler? **[6]**

b) Explain Compile and Go loader. **[6]**

Q5) a) Draw and explain process control block. **[6]**

b) Explain various states of process with diagram. **[5]**

OR

Q6) a) Explain SJF in detail. **[6]**

b) Explain scheduling criteria in detail. **[5]**

P.T.O.

Q7) a) List the requirements of Mutual Exclusion. **[6]**

b) Write a semaphore solution for readers-writers problems. **[6]**

OR

Q8) a) What is the difference among deadlock avoidance, detection and prevention? **[6]**

b) Explain the Critical Section Criteria with example. **[6]**

Q9) a) Differentiate - Contiguous & Non-contiguous Memory Allocation. **[6]**

b) Explain with example - Best Fit, Worst Fit & First Fit. **[6]**

OR

Q10)a) Explain the concepts - memory fragmentation, memory compaction. **[6]**

b) Differentiate - Paging & Segmentation. **[6]**

Q11)a) Write a note on Disk Structure. **[6]**

b) Explain SSTF when track request - 95,180,34,119,11,123,62,64. Starting from Track no. 50. **[5]**

OR

Q12)a) Differentiate SCAN and CSCAN with example. **[6]**

b) Explain with example any three File Allocation Methods. **[5]**

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SEAT No. :

P6791

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[6183]-503
First Year M.C.A. (Engg.)
DATABASE MANAGEMENT SYSTEM
(2019 Pattern) (Semester - II) (310912)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10, Q11 or Q12.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***All questions are compulsory.***
4) ***Figures to the right indicate full marks.***
5) ***Use of electronic pocket calculator is allowed.***
6) ***Assume Suitable data if necessary.***

Q1) a) Explain components of DBMS along with its Architecture. **[6]**

b) Write difference between DBMS and File Processing System. **[6]**

OR

Q2) a) Explain database Schema with example. **[6]**

b) Discuss different layers of data abstraction. **[6]**

Q3) a) Draw an ER diagram for a company needs to store information about employees (identified by ssn, with salary and phone as attributes), departments (identified by dno, with dname and budget as attributes), and children of employees (with name and age as attributes). Employees work in departments, each department is managed by an employee; a child must be identified uniquely by name when the parent (who is an employee; assume that only one parent works for the company) is known. We are not interested in information about a child once the parent leaves the company. **[8]**

b) Explain with example strong and weak entities. **[4]**

OR

Q4) a) Explain types of attributes in ER model with an example. **[6]**

b) Discuss various keys used in database design. **[6]**

P.T.O.

Q5) a) Choose a database application of your choice. Design a schema and apply different types of constraint on Schema. **[8]**

b) Explain Indexing in database with example. **[3]**

OR

Q6) a) State and Explain all the DDL statements with syntax and examples. **[8]**

b) Describe the use of Super key in database design. **[3]**

Q7) What is joins in sql? Explain types of joins with suitable example. **[12]**

OR

Q8) a) What is trigger? Explain types of triggers with example. **[6]**

b) Explain difference between stored procedure and function with example. **[6]**

Q9) a) What is the need of normalization? Explain 3NF in detail. **[6]**

b) What is Lossy and Lossless decomposition ?Explain with example. **[6]**

OR

Q10) Normalize following relation up to 3NF with proper explanation and draw ERD {cstno, custname, prodno, proddesc, qty_ordered, custaddress, date_ordered, order_descr, qty_available, price_per_unit, total_cost} **[12]**

Q11) Explain Hbase Architecture. **[11]**

OR

Q12) a) What are the advantages of NOSQL over SQL. **[5]**

b) Write short note on : Non Relational Database system. **[6]**

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First Year M.C.A. (Engineering)

JAVA PROGRAMMING

(2019 Pattern) (Semester - II) (310913)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10, Q11 or Q12.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume Suitable data if necessary***

Q1) a) What are the data types in java and Explain in details? **[6]**

b) Explain One and Multidimensional Array with Example. **[6]**

OR

Q2) a) What is a wrapper class? Why we need wrapper classes in java? Advantages of Wrapper Classes. **[6]**

b) Write a Java program to find the number of even and odd integers in a given array of integers. **[6]**

5	9	4	3	8

Q3) a) What is a class and object? How to declare and Initialized object of a class with example. **[6]**

b) How to access Static variable of Outer class from Static Inner class in java? **[6]**

OR

Q4) a) Difference between Method Overloading and Method Overriding in java. **[6]**

b) How to Create and Use Packages in Java? **[6]**

Q5) a) Explain Life cycle of a thread. **[6]**

b) What is Exception Handling? Explain in details with example. **[5]**

OR

P.T.O.

Q6) a) Write a Program for ExceptionHandling Divide by zero Using java Programming. **[6]**

b) Which method we implement for runnable interface? Why implementing runnable interface is better? **[5]**

Q7) a) Explain Applet Life Cycle with Diagram. **[6]**

b) Write a program to draw a ellipse using drawLine function. **[6]**

OR

Q8) a) Difference between AWT and Swing in Java. **[6]**

b) What is the benefit of AWT in Java? **[6]**

Q9) a) Explain types of ByteStream Classes in Java. **[6]**

b) Explain Input-output (IO) in Java with Examples. **[6]**

OR

Q10)a) Difference between Character Stream and Byte Stream in Java. **[6]**

b) What is stream in Java? List out its types in details. **[6]**

Q11)a) Write down the tabular difference between JDBC and ODBC driver. **[6]**

b) What are the types of JDBC driver and Explain with suitable example. **[5]**

OR

Q12)a) What is metadata What is ResultSet metadata when is ResultSet metadata useful? **[6]**

b) Explain Architecture of JDBC in details. **[5]**

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[6183]-505
First Year M.C.A. (Engineering)
COMPUTER ORGANIZATION
(2019 Pattern) (Semester - II) (310914)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4,Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or .Q12.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) What is utility program? List out some of the task commonly performed by utility program. **[6]**

b) Explain with example 1's & 2's complement. **[6]**

OR

Q2) a) Write a note on:- Linker, Interpreter **[6]**

b) Explain De-Morgan's Theorem and duality theorem. **[6]**

Q3) a) Explain the BUS structure in CPU. **[6]**

b) Explain th representation of floating point. **[5]**

OR

Q4) a) Explain Booth's Algorithm with the help of flowchart. **[5]**

b) Explain various functional units of computer. **[6]**

Q5) a) Write a note on:

i) DRAM

ii) SDRAM

iii) RDRAM

iv) DDR **[6]**

b) What is cache memory? Explain its types. **[6]**

OR

Q6) a) Explain the hierarchy of Compuer Memory. **[6]**

b) Explain the term DMA. **[6]**

P.T.O.

Q7) a) Explain with example various addressing modes. **[6]**

b) Explain in brief various registers used in computer. **[6]**

OR

Q8) a) What is Instruction fetch and execution cycle? Explain in detail. **[6]**

b) Explain various types of instructions. **[6]**

Q9) a) Explain the term CISC & RISC. **[5]**

b) What is timing diagram? Explain any instruction with this. **[6]**

OR

Q10)a) Explain the term-Pipelining. **[6]**

b) Explain the superscalar concept in brief. **[5]**

Q11)a) What is parallel processing computing? Explain with example. **[6]**

b) Write a note on:- SISD, SIMD, MIMD, MISD. **[6]**

OR

Q12)a) Write a note on Cluster Architecture. **[6]**

b) Explain multiprocessor organization in brief. **[6]**

Total No. of Questions : 12]

SEAT No. : ____

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[6183]-507

F.Y. M.C.A. (Engineering)

DATA STRUCTURES

(2019 Pattern) (Semester-I) (310902)

Time : 3 Hour] ***[Max. Marks : 70***

Instructions to the candidates :

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right indicate full marks.***
3) ***Assume suitable data, if necessary.***

Q1) a) What is Abstract Data Type (ADT)? Explain Array as ADT. **[6]**

b) What is data structure? Explain different data structures with examples. **[6]**

OR

Q2) a) What are multi dimensional arrays? Explain row major and column major representation of array storage. **[6]**

b) Explain the concept of linear and non linear data structures with examples. **[6]**

Q3) a) Explain Singly Linked List with operations in diagram. **[6]**

b) Explain insert operation in doubly linked list with diagram? **[6]**

OR

Q4) a) Explain Linked List types with diagram. **[6]**

b) Explain delete operations in singly linked list(first, middle, last element) with diagram? **[6]**

Q5) a) Where the stack data structures are used in sequential organization? Explain with examples. **[6]**

b) Write all operations on stacks with pseudo code? **[5]**

OR

P.T.O.

Q6) a) How to perform infix to post fixed expression conversion using stacks? **[6]**

b) How stacks are useful to implement using recursion process? Explain with application **[5]**

Q7) a) How to define Queues Using Arrays? What are limitations of singular queue? **[6]**

b) Give detail explanation of Array implementation of priority queue? What are applications of priority queue? **[6]**

OR

Q8) a) Explain Circular Queue with example? **[6]**

b) Explain queue implementation using linked list? Explain with diagram en-queue and de-queue operations? **[6]**

Q9) a) Differentiate between trees and graph data structure? **[6]**

b) How tree traversing takes place? Explain all 3 tree traversing techniques? **[6]**

OR

Q10)a) How to represent graph using adjacency matrix and adjacency list? **[6]**

b) Explain graph traversing methods with pseudo code. **[6]**

Q11)a) Apply binary search on following data and show step by step working

3, 7, 11, 15, 23, 34, 47, 49, 59, 63, 64, 70, 86, 90,. To search key 15 in it. **[6]**

b) Compare Bubble sort; Insertion sort and Selection sort techniques. **[5]**

OR

Q12)a) Write Quick sort algorithm and explain with example. **[6]**

b) How sentinel search algorithm works? Discuss the limitations of linear search? **[5]**

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[6183]-508

F.Y. M.C.A. (Engineering)

OBJECT ORIENTED PROGRAMMING

(2019 Pattern) (Semester - I) (310903)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right side indicate full marks.***
3) ***Assume Suitable data if necessary.***

Q1) a) What are the advantages and benefits of Object-Oriented Programming. **[6]**

b) Explain the structure of Bottom up approach. **[6]**

OR

Q2) a) Write down the Syntax and Structure of C++ Programming language. **[6]**

b) Define comment. Why is it important to write comments in programs? **[6]**

Q3) a) Write the various operators with example used in C++. **[5]**

b) Create a class staff having fields: Staff_id , name, salary. Write a menu driven program for : i) To accept the data ii) To display the data **[6]**

OR

Q4) a) Describe with examples Inline function and static data member. **[5]**

b) Write an OOP to add two complex numbers using copy constructor concept. **[6]**

Q5) a) What is an operator overloading? List out the Pitfalls of Operator Overloading. **[6]**

b) What is polymorphism? Explain run time polymorphism in details. **[6]**

OR

Q6) a) Differentiate between multiple and multilevel inheritance in C++? **[6]**

P.T.O.

b) We know that a private member of a base class is not inheritable. Is it anyway possible for the objects of a derived class to access private members of the base class? If yes, how? Remember, the base class cannot be modified. **[6]**

Q7) a) Demonstrate with suitable example the use of polymorphism with a Friend function. **[6]**

b) What is virtual function? Why do we need virtual functions? **[5]**

OR

Q8) a) Illustrate the concept of dynamic binding with suitable example. **[5]**

b) Explain the concept of this pointer. **[6]**

Q9) a) Why templates are used in C++? How many types of templates are there in C++? **[6]**

b) Write a Program to find Largest among two numbers using function template. **[6]**

OR

Q10)a) Explain how exception handling mechanism can be used for debugging a program. **[6]**

b) What is generic programming? How is it implemented in C++? **[6]**

Q11)a) What is stream? Describe briefly the features of I/O system supported by CPP. **[6]**

b) How do the I/O facilities in C++ differ from that in C language. **[6]**

OR

Q12)a) Discuss the various form of get() functions supported by the input stream. How are they used? **[6]**

b) Write the use of following functions in details : **[6]**

i) getline() ii) read()

iii) seekg() iv) tellg()

v) seekp() vi) tellp()

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F.Y. M.C.A. (Engineering)

PRINCIPLES OF PROGRAMMING

(2019 Pattern) (Semester - I) (310904)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates :

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right indicate full marks.***
3) ***Assume suitable data, if necessary.***

Q1) a) Describe the following **[6]**

i) Volatile Memory ii) Firmware

b) What are the different ways of acquiring software? List out their advantages and limitations. **[6]**

OR

Q2) a) Differentiate between procedures oriented and object oriented programming paradigm. **[6]**

b) Which difficulties faced in problem solving? **[6]**

Q3) a) Explain in detail various primitive and abstract data types. **[6]**

b) Explain the top down and bottom up approach. **[6]**

OR

Q4) a) Explain the difference between local and global variables. **[6]**

b) Define the two types of parameters. How do they differ? **[6]**

Q5) a) Discuss selection and iterative structures in detail. **[6]**

b) Write a program which uses a recursive algorithm. Explain how Subroutines are generated? **[5]**

OR

P.T.O.

Q6) a) Write an algorithm for reversing digits of a number. **[6]**

b) Why cohesion and coupling are important to programmers. **[5]**

Q7) a) Write an algorithm to find a missing number. Find frequency count of each step. **[6]**

b) Define “Big oh” and “omega” notations. **[6]**

OR

Q8) a) Write a program for GCD. **[6]**

b) What is flowchart? Explain all the symbols used to draw a flowchart. **[6]**

Q9) a) Write an algorithm to find a square root of a number. **[6]**

b) Write an algorithm for exchange of values of two variables without using a third variable. **[6]**

OR

Q10)a) Explain binary search algorithm with example. **[6]**

b) Compare Testing and Debugging. **[6]**

Q11)a) Explain row major and column major form of array representation. **[6]**

b) Explain Look up table technique with example. [5]

OR

Q12)a) Explain different methods of data organizing. **[6]**

b) Explain bubble sort in detail. **[5]**

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F.Y. M.C.A. (Engineering)

MANAGEMENT THEORY AND PRACTICES

(2019 Pattern) (Semester - I) (310905)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) What are various skills of manager? **[6]**

b) Discuss contribution of Henry Feyol to the management science. **[6]**

OR

Q2) a) Define management. Explain different functions of management. **[6]**

b) Discuss contribution of F.W. Taylor to the development of management. **[6]**

Q3) a) Explain the difference between formal and informal organisation. **[6]**

b) Draw block diagram and explain Matrix and Project structure of organisation. **[6]**

OR

Q4) a) Differentiate between MOA and AOA in detail. **[6]**

b) Draw block diagram and explain Line and Staff organisation. **[6]**

Q5) a) Explain Hersey and Blanchard theory. **[6]**

b) Explain importance of leadership in an organization. **[5]**

OR

Q6) a) Explain Black and Moutan's theory. **[6]**

b) What is Group? Explain the types of group. **[5]**

P.T.O.

Q7) a) Short note on Total quality management. **[6]**

b) Explain Theory X and Theory Y of motivation. **[6]**

OR

Q8) a) Short note on Re-engineering. **[6]**

b) What is conflict management? Explain various stages of conflict resolution. **[6]**

Q9) a) Short note on Enterprise Resource planning. **[6]**

b) Explain applications of MIS in academics. **[6]**

OR

Q10) a) Short note on Supply Chain Management. **[6]**

b) Explain importance of Management Information Systems in service industry. **[6]**

Q11) a) Explain Programmable decisions and Non programmable decisions. **[6]**

b) Explain Herbert Simpson's Model. **[5]**

OR

Q12) a) Explain structured decisions and unstructured decisions with example. **[6]**

b) What should be done to reduce risk of decision making? **[5]**

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[6183]-511

S.Y. M.C.A. (Engineering)

WEB PROGRAMMING

(2019 Pattern) (Semester - III) (410901)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right side indicate full marks.***
3) ***Assume Suitable data if necessary.***

Q1) a) Differentiate between HTML and HTML5. **[6]**

b) Define CSS. How it can be used in designing a web page? Explain with a suitable example. **[6]**

OR

Q2) a) Write a code in HTML5 to design a web page of a career counseling firm. **[6]**

b) Explain the concept of XML DTD and XML Schema with a suitable example. **[6]**

Q3) a) What is Client side scripting? Explain any two client side scripting technologies with a suitable example. **[6]**

b) Explain properties and methods of JavaScript. **[6]**

OR

Q4) a) What is DOM Object? Explain its properties and methods. **[6]**

b) Explain the concept of JQuery with selecting, creating, appending elements. **[6]**

Q5) a) Define JSP. What are the advantages of JSP over Servlet? **[6]**

b) Explain Servlet life cycle with a suitable example. **[5]**

OR

Q6) a) Explain JDBC Connectivity with JSP with a suitable Example. **[6]**

b) Explain the concept of Session Management in Servlet. **[5]**

Q7) a) What is a script? Explain Server side scripting with example. **[6]**

b) Explain the concept of Cookies and sessions with a suitable example. **[6]**

OR

Q8) a) How to create a database in MYSQL and how to create a table in it? Also explain How to insert data into it. **[6]**

b) What is Ajax? Explain its applications in Web Technology. **[6]**

Q9) a) Explain MVC architecture in angular JS. **[6]**

b) Differentiate between NodeJS and React JS. **[6]**

OR

Q10) a) What is Struts? Explain its architecture and Configuration. **[6]**

b) Explain the concept of interceptors and Exception handling in Struts. **[6]**

Q11) a) What are Web Services? Explain different types of Web Services. **[6]**

b) Differentiate between SOAP and REST. **[5]**

OR

Q12) a) Write a short note on : **[6]**

i) Bootstrap

ii) JSF

iii) Spring

b) What is EJB? Explain the architecture of EJB. **[5]**

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P-6800

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S.Y. M.C.A. (Engineering)

BANKING FINANCE & ACCOUNT MANAGEMENT

(2019 Pattern) (Semester - III) (410902)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right side indicate full marks.***
3) ***Assume Suitable data if necessary.***

Q1) a) Explain how the regulatory authorities will be beneficial in order to boost the banking sector. **[6]**

b) Explain any 5 laws of bank. **[6]**

OR

Q2) a) Write a note on NABARD. **[6]**

b) Write a note on Negotiable Instrument Act. **[6]**

Q3) a) Write down the difference between NEFT and RTGS. **[6]**

b) What do you mean by Cheques explain all types of cheques. **[6]**

OR

Q4) a) Write the Difference between standing Instructions and straight through processing. **[6]**

b) Write a note on Warrants and dividend. **[6]**

Q5) a) Write a note on CBS (Core Banking System). **[6]**

b) Explain digital payments concept along with example? **[5]**

OR

Q6) a) Write down the difference between Inter and Intra Banking systems. **[6]**

b) Explain any one payment gateway along with example. **[5]**

P.T.O.

Q7) a) What are the Four Basic Financial Statements? Explain in Detail. **[6]**

b) Explain Types of Book keeping system and Methods of Book keeping in Detail. **[6]**

OR

Q8) a) What is the preparation of Trial balance? Explain any Five Steps in Preparation of Trial Balance in Detail. **[6]**

b) Write a Difference Between Trading Account and Profit and Loss Account in Detail with any business example. **[6]**

Q9) a) What is Overhead? Classification of Overhead ,explain most common overhead costs that used any business **[6]**

b) List out and Explain Four Common Liquidity Ratios in Accounting. **[6]**

OR

Q10)a) What is the Break-Even Point and How Do You Calculate It? Write a Formula and Explain With Example. **[6]**

b) What are the Key Components of Efficiency Ratios? Explain with Example. **[6]**

Q11)a) List out and explain the different types of working capital? **[6]**

b) How Do You Calculate Working Capital? Explain Steps and Formula for to Calculate Working Capital. **[5]**

OR

Q12)a) Solve this case Using Cash Forecasting Method John Trading Co. has asked you to prepare a working capital forecast using the following information: Issued share capital: $400,000 8% deb.: $1,50,000 Fixed assets are valued at $300,000 Production: 100,000 units. Expected ratios of cost to selling price are: R.M. 50%, Wages: 10%, Overheads: 25% = 85%. **[6]**

b) List out and Explain Methods for Estimating Working Capital Requirement in Detail. **[5]**

Total No. of Questions : 12]

SEAT No. :

P-6801

[Total No. of Pages : 2

[6183]-513
S.Y. M.C.A. (Engineering)
COMPUTER NETWORKS
(2019 Pattern) (Semester - III) (410903)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right side indicate full marks.***
3) ***Assume Suitable data if necessary.***

Q1) a) Describe TCP / IP Reference Model with diagram. **[8]**

b) Explain Frequency Hopping (FHSS). **[4]**

OR

Q2) a) Explain Manchester and Differential Manchester Encodings with an example. **[6]**

b) Explain various networking devices. **[6]**

Q3) a) Explain HDLC Protocol. **[5]**

b) Explain Sliding Window Protocol. **[7]**

OR

Q4) a) Explain Stop and Wait protocol. **[7]**

b) Explain Hamming Codes with an example. **[5]**

Q5) a) Explain pure and slotted ALOHA. **[6]**

b) Explain WDMA. **[5]**

OR

Q6) a) Explain Fast Ethernet, Gigabit Ethernet **[6]**

b) Explain IEEE 802.15. **[5]**

P.T.O.

Q7) a) Write difference between IPV4 and IPV6. **[6]**

b) Explain the services provided by Network layer .Explain any congestion control algorithm in detail. **[6]**

OR

Q8) a) Explain the following terms. **[6]**

i) RIP

ii) Mobile IP

iii) AODV

b) What is switching? Write difference between packet switching and circuit switching. **[6]**

Q9) a) Write difference between TCP and UDP. **[6]**

b) Explain RTP and SCTP protocols. **[6]**

OR

Q10) a) Explain TCP timer management & TCP congestion control in detail. **[6]**

b) Write the difference between integrated services and differentiated services. **[6]**

Q11) a) Explain how electronics mail works and list out the services offered by SMTP. **[6]**

b) Write difference between peer to peer and client server paradigm. Explain DHCP protocol in detail. **[5]**

OR

Q12) a) How domain Name System converts DNS to IF address write in detail. **[6]**

b) Write short note on : **[5]**

i) HTTP

ii) SMTP

iii) DNS

iv) TFTP

v) MIME

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Total No. of Questions : 12]

SEAT No. : ____

P-6802

[Total No. of Pages : 2

[6183]-514

S.Y. M.C.A. (Engineering)

PYTHON PROGRAMMING

(2019 Pattern) (Semester - III) (410904)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right side indicate full marks.***
3) ***Assume suitable data if necessary.***

Q1) a) List and explain features of python. **[6]**

b) Explain in detail rules for declaring variables and identifiers in python. **[6]**

OR

Q2) a) List and Explain Built-in Data Types in python and also explain how data types are set. **[6]**

b) Explain Logical and Comparison Operators. **[6]**

Q3) a) Explain various control flow statements with example. **[6]**

b) Write a note on Tuples, List and Dictionary data type with example. **[6]**

OR

Q4) a) Describe while loop and for loop with suitable example. **[6]**

b) Write a python program to implement nested for loop and make use of break and continue keywords. **[6]**

Q5) a) List and Explain minimum six Built-in functions used in python. **[6]**

b) What is function? Write a python program to find Factorial of Number Using Recursion. **[5]**

OR

Q6) a) Write a note on keyword arguments, Explain with example *args and * *kwargs. **[6]**

b) Explain String slicing and string joining with suitable program. **[5]**

P.T.O.

Q7) a) What is dictionary in python? Write a python program to create, access and modify key value pair in dictionary. **[6]**

b) List and Explain various python dictionary methods. **[6]**

OR

Q8) a) What is del statement? Write a program to demonstrate concept of del keyword for variables. **[6]**

b) What is set in python? List and explain various set methods. **[6]**

Q9) a) Explain read and write method with suitable program. **[6]**

b) What is pickle module? Explain following. **[6]**

i) Dump
ii) Load
iii) Loads
iv) HIGHEST_PROTOCOL
v) DEFAULT_PROTOCOL

OR

Q10) a) What is globe module? Write a program to search CSV file using globe. **[6]**

b) Explain in detail python os and os.path modules. **[6]**

Q11) a) Write note on following : **[6]**

i) Class
ii) Inheritance
iii) Polymorphism

b) Explain in detail class attribute and data attribute with example. **[5]**

OR

Q12) a) What is constructor in python? Explain with example how to create. **[6]**

i) Class
ii) Constructor
iii) Multiple objects

b) What is operating system interface in python? Write a note on following. **[5]**

i) Multi threading
ii) Data compression
iii) GUI Programming

Total No. of Questions : 12]

SEAT No. : ____

P-6803

[Total No. of Pages : 2

[6183]-515

S.Y. M.C.A. (Engineering)

MANAGEMENT INFORMATION SYSTEM

(2019 Pattern) (Semester-III) (410905)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates :

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right side indicate full marks.***
3) ***Assume suitable data, if necessary.***

Q1) a) How MIS organization within the company? **[6]**

b) Explain Decision support systems of MIS. **[6]**

OR

Q2) a) What is MIS? Explain in brief. **[6]**

b) Explain Managers view of Information systems. **[6]**

Q3) a) What are the different factors that affect forms of business organization? **[6]**

b) Write note on Information System in the Enterprise. **[6]**

OR

Q4) a) Introduce Enterprise applications. **[6]**

b) Differentiate Integrating functions and business processes. **[6]**

Q5) a) Explain Evolution of an information system. **[6]**

b) Write note on decision making and MIS. **[5]**

OR

Q6) a) How MIS as a technique for making programmed decisions applicable in organization? **[6]**

b) Explain Basic information systems. **[5]**

P.T.O.

Q7) a) Differentiate Strategic and Project planning for MIS. **[6]**

b) What is General business planning? **[6]**

OR

Q8) a) Explain Strategic and Project planning for MIS. **[6]**

b) Explain appropriate MIS responses. **[6]**

Q9) a) Explain the role of Management Information Systems (MIS) in the academic. **[6]**

b) Explain in detail Transaction Processing Systems as an application of MIS. **[6]**

OR

Q10)a) Write short note on Supply Chain Management (SCM). **[6]**

b) List the application of MIS. **[6]**

Q11)a) Write a difference between Open System and Closed System. **[6]**

b) Explain Implementation, evaluation and maintenance of MIS. **[5]**

OR

Q12)a) Write short note on-Detailed system design and Implementation. **[6]**

b) How maintain the system. **[5]**

Total No. of Questions : 12]

SEAT No. :

P6804

[Total No. of Pages : 2

[6183]-516

S.Y.M.C.A. (Engineering)

SOFTWARE ENGINEERING & PROJECT MANAGEMENT

(2019 Pattern) (Semester - IV) (410912)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain spiral process model. **[6]**

b) What is Agile manifesto? Explain difference between traditional software development and agile development. **[6]**

OR

Q2) a) Explain software engineering process framework activities. **[6]**

b) Explain why incremental development is the most effective approach for developing business software systems. Why is this model less appropriate for real-time systems engineering? **[6]**

Q3) a) Explain functional and non functional requirements of software. **[6]**

b) What is requirement elicitation? Write the elicitation work products. **[6]**

OR

Q4) a) Explain tasks included in requirement engineering. **[6]**

b) What is meant by normal and exciting requirements? How requirements are validated? **[6]**

Q5) a) What are the merits and demerits of Agile process model? **[6]**

b) What is the importance of XP methodology for project development? **[5]**

OR

Q6) a) Explain refactoring and pair programming. **[6]**

b) Explain Scrum approach to project management. **[5]**

P.T.O.

Q7) a) What do you mean by software metrics? Describe advantages of software Metrics. **[6]**

b) What do you mean by software measurement size? Explain function oriented metrics. **[6]**

OR

Q8) a) Short note on - Metrics for Testing and maintenance. **[6]**

b) What is software quality? What are factors affecting software quality? **[6]**

Q9) a) Short note on - work Breakdown structure with eg. **[6]**

b) Explain project initation and project scope management. **[6]**

OR

Q10)a) Short note on - Gantt charts in scheduling project work with example. **[6]**

b) Explain Cost estimation tools and techniques in project planning. **[6]**

Q11)a) Explain software project management in detail. **[6]**

b) Short note on - Software Configuration management. **[5]**

OR

Q12)a) Short note on -software maintenance. **[6]**

b) Explain importance of project risk management. **[5]**

Total No. of Questions : 12]

SEAT No. :

P6805

[Total No. of Pages : 2

[6183]-517
S.Y.M.C.A. (Engineering)
MOBILE COMPUTING
(2019 Pattern) (Semester - IV) (410913)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Figures to the right indicate full marks.***
3) ***Assume Suitale data if necessary.***

Q1) a) Explain the generations of Cellular network (1G, 2G, 2.5G, 3G, 4G) with respective standards. **[6]**

b) Explain Source Encoding, Channel Encoding and Modulation with one example. **[6]**

OR

Q2) a) What are the advantages of Wireless Networks? Classify different wireless networks based on their range. **[6]**

b) As the signal travels the distance its power becomes weaker-justify, also explain various wireless communication problems. **[6]**

Q3) a) Explain Wireless multiple access protocols. **[6]**

b) Explain Mobility Databases. **[6]**

OR

Q4) a) Explain Wireless multiple access protocols. **[6]**

b) What is adaptive clustering for mobile wireless networks. **[6]**

Q5) a) Explain WAP Architecture. **[6]**

b) Explain WML. **[5]**

OR

P.T.O.

Q6) a) Explain TCP over wireless. **[6]**

b) Explain Mobile IP. **[5]**

Q7) a) Explain GSM Architecture. **[6]**

b) Explain GPRS. **[6]**

OR

Q8) a) Compare the features mobile O.S. : Windows and android. **[6]**

b) Explain about UI Layout of android. State the types of layout. Explain in brief two of them. **[6]**

Q9) a) Explain file structure in android O.S. **[6]**

b) Explain the location based services. **[6]**

OR

Q10)a) Explain GSM :Architecture and Protocols. **[6]**

b) Location Update Procedure in GSM. **[6]**

Q11)a) Write a short note on Bluetooth. How it can access in android? **[6]**

b) Explain in brief Peer to peer to communication. **[5]**

OR

Q12)a) Explain mobile agent based architecture. **[6]**

b) Explain Android Hardware in details. **[5]**

Total No. of Questions : 12]

SEAT No. :

P6806

[Total No. of Pages : 2

[6183]-518

S.Y.M.C.A. (Engineering)

DATA SCIENCE WITH R

(2019 Pattern) (Semester - IV) (410914)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q9 or Q10, Q11 or Q12.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume Suitable data jf necessary***

Q1) a) What is Data Science? Explain Purpose of Data Science? **[6]**

b) Explain the Role of Data Scientist for successful analytic project. **[6]**

OR

Q2) a) Differentiate between Qualitative vs Quantitative Data and Big Data Vs. Little Data. **[6]**

b) Explain Data science process in detail. **[6]**

Q3) a) What is R? Explain advantages and disadvantages of R. **[6]**

b) Differentiate between vector, List, Matrix, and Data frame with example. **[6]**

OR

Q4) a) How can one perform decision making in R? Explain with example. **[6]**

b) What is the difference between data frame and a matrix in R? **[6]**

Q5) a) Explain working of Nearest Neighbor classifier with suitable example. **[6]**

b) What is Naïve Bayes Classifier? Why it is called Naïve Bayes? **[5]**

OR

Q6) a) How Decision tree works? Explain with example step by step. **[6]**

b) Where Regression methods are applied? How it plays important role in data analysis? **[5]**

P.T.O.

Q7) a) Explain with example the agglomerative Clustering algorithm? **[6]**

b) Explain the process of outlier detection with its application? **[6]**

OR

Q8) a) Explain hierarchical clustering with real life example? **[6]**

b) Discuss methods of performance evaluation of clustering algorithm using R? **[6]**

Q9) a) A database has 4 transactions, shown below. **[6]**

TID	Date	items_bought
T100	10/15/04	{K, A, D, B}
T200	10/15/04	{D, A, C, E, B}
T300	10/19/04	{C, A, B, E}
T400	10/22/04	{B, A, D}

Assuming a minimum level of support min_sup = 60% and a minimum level of confidence min_conf= 80%:

Find all frequent item sets (not just the ones with the maximum width/ length) using the Apriori algorithm. Show your work–just showing the final answer is not acceptable. For each iteration show the candidate and acceptable frequent item sets.

b) Compare the Precision and Recall metrics for classifier evaluation. Illustrate your answer using the Confusion Matrix. **[6]**

OR

Q10)a) What are the limitations of Apriori algorithm? How FP growth algorithms overcome the drawbacks of Apriori? **[6]**

b) Which method is used to mine data in vertical format? Explain with application? **[6]**

Q11)a) Highlight the importance of chart in data visualization? Describe with chart types and its usability? **[6]**

b) With help of data explain how to use scatter plot for data analysis? **[5]**

OR

Q12)a) How R programming provided support for data visualization? Discussed advantages of R in graphical representation of data? **[6]**

b) Draw and explain any 5 types of charts supported by R programming? **[5]**

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Total No. of Questions : 12]

SEAT No. :

P6807

[Total No. of Pages : 2

[6183]-519

S.Y.M.C.A. (Engineering)

OBJECT ORIENTED MODELING & DESIGN

(2019 Pattern) (Semester - IV) (410915)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10, Q11 or Q12.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume Suitable data if necessary***

Q1) a) Explain 4 + 1 view architecture in detail. **[6]**

b) What is UML? Explain role of UML in OO designing. **[6]**

OR

Q2) a) Explain basic building blocks of UML in detail. **[6]**

b) Write a short note on Unified Process. **[6]**

Q3) a) Explain types of relationships used in a class diagram. **[6]**

b) What are the four adornments that apply to associations? **[6]**

OR

Q4) a) What is an object diagram? Explain with example. **[6]**

b) By considering suitable assumptions, draw a class diagram for online shopping system. **[6]**

Q5) a) What is component diagram? Where to use it? **[6]**

b) Explain deployment diagrams purpose in OO designing. **[5]**

OR

Q6) a) Comment on UML in web Applications. **[6]**

b) Write a short note on package diagram. **[5]**

P.T.O.

Q7) a) Explain Interaction Overview Diagram with example. **[6]**

b) Draw sequence diagram for Withdraw money in ATM system. **[6]**

OR

Q8) a) What is timing diagram in UML? Explain it with example. **[6]**

b) Draw Communication diagram for placing order on online shopping system. **[6]**

Q9) a) Write note on Service oriented Architecture. **[6]**

b) Explain Component based Architecture. **[6]**

OR

Q10)a) Write note on Object oriented software architecture. **[6]**

b) Define Software Architectural Design. Explain Architectural Styles. **[6]**

Q11)a) Define Pattern. Explain types of design patterns. **[6]**

b) What is Creational design pattern? Explain singleton pattern in brief. **[5]**

OR

Q12)a) Explain Adapter design pattern. **[6]**

b) Explain Iterator design pattern. **[5]**

Total No. of Questions : 12]

SEAT No. :

P6808

[Total No. of Pages : 2

[6183]-520
S.Y. M.C.A. (Engineering)
ARTIFICIAL INTELLIGENCE
(2019 Pattern) (Semester - IV) (Elective - I) (410916 A)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4,Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or .Q12.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) What is artificial intelligence (AI)? How does AI work? Why is artificial intelligence important? What are the advantages and disadvantages of artificial intelligence? **[6]**

b) Explain Problem Solving in AI. **[6]**

OR

Q2) a) Explain in detail types of Artificial Intelligence. **[6]**

b) Discuss and explain in detail applications of AI in real world. **[6]**

Q3) a) Explain Depth Bounded DFS. **[6]**

b) Explain A* algorithm along with example, advantages, disadvantages, time and space complexity. **[6]**

OR

Q4) a) Explain Hill Climbing Algorithm in Artificial Intelligence. **[6]**

b) Explain any one optimal search algorithm in detail. **[6]**

Q5) a) What are the differences between forward reasoning and backward reasoning in AI. **[6]**

b) What is Logic Programming? How to solve any problem using logic programming? **[5]**

OR

Q6) a) What is knowledge representation and What are types of knowledge? **[6]**

b) Explain in detail Pattern Matching in AI. **[5]**

P.T.O.

Q7) a) Explain in detail all the phases of Natural Language Processing (NLP). **[6]**

b) Explain the architecture of information retrieval system. **[5]**

OR

Q8) a) Explain the applications of Natural Language Processing. **[6]**

b) Comment on problem regarding natural language processing (NLP) in information retrieval (IR). **[5]**

Q9) a) Explain the architecture of Artificial Neural Network. **[6]**

b) Write short note on Boltzman Machine. **[6]**

OR

Q10)a) With the help of an architecture diagram explain multilayer feed forward artificial neural network. **[6]**

b) Explain Error Back Propagation Algorithm with the help of diagram. **[6]**

Q11)a) Explain supervised and unsupervised learning with an example. **[6]**

b) What is Learning? Explain Learning from examples and Explanation-Based learning. **[6]**

OR

Q12)a) What is Learning? Explain Rote Learning and learning by taking Advice. **[6]**

b) Write a short note on Expert Systems & its Architecture. **[6]**

Total No. of Questions : 12]

SEAT No. :

P6809

[Total No. of Pages : 2

[6183]-521
S.Y. M.C.A. (Engineering)
INFORMATION SECURITY
(2019 Course) (Semester - IV) (410916 B)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right side indicate full marks.***
3) ***Assume suitable data if necessary.***

Q1) a) Write short note on Network Security. **[6]**

b) Difference between Security and Privacy. **[6]**

OR

Q2) a) Explain different elements of information security. **[6]**

b) Discuss about Threats and Vulnerability. **[6]**

Q3) a) Explain in brief Data Encryption Standard (DES). **[6]**

b) What are block ciphers and methods of block cipher? **[6]**

OR

Q4) a) Explain Advance Encryption Standard (AES). **[6]**

b) Describe the applications and limitations of stenography. **[6]**

Q5) a) Explain RSA algorithm in detail. **[6]**

b) Write short note on Kerberos and Cryptography. **[5]**

OR

Q6) a) Explain Deffie-Hellman Key Exchange Algorithm. **[6]**

b) Write short note on VPN. **[5]**

P.T.O.

Q7) a) Differentiate between IPv4 and IPv6 Explain in detail. **[6]**

b) What is SSL? Explain SSL Protocol Stack in detail. **[6]**

OR

Q8) a) What is the alert protocol in SSL? Explain various alert messages of Alert Protocol in detail. **[6]**

b) What is PGP? Explain the services offered by PGP in Detail. **[6]**

Q9) a) What is a firewall? Explain Types of Firewall. **[6]**

b) What is IDS? Explain types of IDS in Detail. **[6]**

OR

Q10)a) What is Password Management? Explain with Definition, Components, and Best Practices of Password Management. **[6]**

b) Discuss on Trusted Systems in Network Security? Explain Trusted Systems based on different level of security. **[6]**

Q11)a) What is personally identifiable information (PII)? List out and explain Sensitive vs. Non-Sensitive Personally Identifiable Information. **[6]**

b) What is Cyberstalking? Explain How to Prevent Cyber stalking in detail. **[5]**

OR

Q12)a) What is the Information Technology Act, 2000? Explain in detail how it is works as data protection laws in India. **[6]**

b) What is cybercrime? Explain Types of Cybercrime with the daily life examples. **[5]**

Total No. of Questions : 12]

SEAT No. :

P6810

[Total No. of Pages : 2

[6183]-522
S.Y. M.C.A. (Engineering)
ANIMATION & GAMING
(2019 Pattern) (Semester - IV) (Elective - I) (410916 C)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4,Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or .Q12.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***

Q1) a) Explain DDA Algorithm of the line drawing. **[6]**

b) Explain Applications of Computer Graphics. **[6]**

OR

Q2) a) Plot a circle by Bresenham's algorithm whose radius is 3 and center coordinates are (0, 0) **[6]**

b) Write difference between raster and random scan display **[6]**

Q3) a) Explain different types of Animation. **[6]**

b) Distinguish between Client-pull and server push animation. **[6]**

OR

Q4) a) Explain Principles of Animation. **[7]**

b) What is meant by rotoscoping and blue screening in animation? **[5]**

Q5) a) List and Explain different Animation Drawing tools. **[6]**

b) What is mean by anatomy and body language? **[5]**

OR

Q6) a) Explain various steps in developing animation character? **[6]**

b) Explain sketching and drawing in detail. **[5]**

P.T.O.

Q7) a) Explain role of AI in game programming in detail. **[6]**

b) What is software architecture? Explain 2D game software architecture. **[6]**

OR

Q8) a) Explain Game development life cycle? **[6]**

b) What is Game Theory? Explain role of graphics in game programming. **[6]**

Q9) a) Explain different Programming Languages used for game design. **[6]**

b) Explain Game development life cycle. **[6]**

OR

Q10) a) Explain Components of Game Engine. **[6]**

b) What are prerequisites to run java on system? Explain basic JDK tools in Java. **[6]**

Q11) a) Explain structure of simple game in java. **[5]**

b) Explain in details blocking v/s non-blocking loops. **[6]**

OR

Q12) a) Which are different state controls in java. **[6]**

b) Explain concept of collision detection. **[5]**

Total No. of Questions : 12]

SEAT No. :

P6811

[Total No. of Pages : 2

[6183]-523
S.Y. M.C.A. (Engineering)
INTERNET OF THINGS
(2019 Pattern) (Semester - IV) (Elective - I) (410916D)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4,Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or .Q12.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***

Q1) a) Explain the functional layers and capabilities of an IoT solution with a neat diagram. **[6]**

b) Define IoT. Identify and explain in detail about IoT. **[6]**

OR

Q2) a) Explain the physical and logical design of IoT in detail. **[6]**

b) Illustrate the various IoT communication APIs. **[6]**

Q3) a) Explain the generic M2M System Solution with a neat diagram. **[6]**

b) Explain the various emerging IoT applications. **[6]**

OR

Q4) a) Describe M2M value chain with a neat diagram. **[6]**

b) Explain various trends in Information and Communication Technologies. **[6]**

Q5) a) What is the need of Network? And Explain in detail the LAN and WAN.**[6]**

b) Discuss in detail about the Aggregation/bus layer. **[5]**

OR

Q6) a) Explain LoRaWAN standard and alliance MAC Layer and Security. **[6]**

b) What are basic components of sensor network? **[5]**

P.T.O.

Q7) a) Write a note on zigbee architecture in IoT. **[6]**

b) Explain SCADA and RFID Protocols. **[6]**

OR

Q8) a) Explain the issues with IoT Standardization? **[6]**

b) Write a note on Unified Data Standards. **[6]**

Q9) a) What is FP7 Project? Explain contribution from FP7 Projects in IoT. **[6]**

b) What are the main types of data aggregation being used in the IoT? **[6]**

OR

Q10)a) Explain Smartie approach for IoT. **[6]**

b) What are the major privacy and security issues in IoT? **[6]**

Q11)a) How IoT can be used in home automation system? **[6]**

b) How IoT transforming manufacturing? Explain future factory concepts in IoT. **[5]**

OR

Q12)a) What are surveillance application in IoT? **[6]**

b) How To Use IoT For Smart Parking Solution Development? **[5]**

Total No. of Questions : 12]

SEAT No. : ____

P-6812

[Total No. of Pages : 3

[6183]-524

T.Y. M.C.A. (Engineering)

DATA MINING & BUSINESS INTELLIGENCE

(2019 Pattern) (Semester - V) (510901)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates :

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right indicate full marks.***
3) ***Assume suitable data, if necessary.***

Q1) a) Illustrate the major issues in Data mining? **[5]**

b) Find dissimilarity between binary variables of (Roma, Mary), (Roma, Jim) and (Mary, Jim) Assume the values Y and P =1 and the values N=0. **[6]**

Name	Fever	Cough	Test-1	Test-2	Test-3	Test-4
Roma	N	N	P	N	N	N
Jim	N	P	N	P	N	N
Mary	Y	P	P	N	N	P

OR

Q2) a) Explain similarities and dissimilarities between characterization and clustering, classification and regression. **[6]**

b) Explain types of attributes with examples. **[5]**

Q3) a) Explain any two data cleaning techniques. **[6]**

b) Explain the need of data pre-processing in BI. Explain various data reduction techniques. **[6]**

OR

Q4) a) Explain data discretization techniques. **[6]**

b) Explain Binning method used in data preprocessing with example. **[6]**

P.T.O.

Q5) a) Consider an example with following set of transactions **[6]**

TID	Items bought
T1	A, B, C
T2	A, B, C, D, E
T3	A, C, D
T4	A, C, D, E
T5	A, B, C, D

Find the frequent itemsets using Apriori algorithm. Consider 40% support.

b) Explain the following terms : **[6]**

i) Constraint based rule mining

ii) Closed and maximal frequent itemsets

OR

Q6) a) Explain Market Basket Analysis with example. **[6]**

b) Explain following measures used in association Rule mining. **[6]**

i) Minimum Support

ii) Minimum Confidence

iii) Association Rule

Q7) a) What is classification? Explain Bayesian Classification with suitable example. **[6]**

b) What are types of regression? **[6]**

OR

Q8) a) What are tools used for data mining and How do data mining tools work? **[6]**

b) Discuss the Issues regarding Classification and prediction in detail. **[6]**

Q9) a) What are the Clustering-Based approaches for outlier detection in data mining? Explain any one in detail. **[6]**

b) What are outliers & its Types? **[6]**

OR

Q10)a) What are the challenges of Outlier Detection in High-Dimensional Data? **[6]**

b) What are the methods of outlier detection? **[6]**

Q11)a) Explain various BI architectures. **[6]**

b) List out Business-Intelligence reporting tools. Explain any two. **[5]**

OR

Q12)a) 'Is Data Mining is useful for Fraud Detection'. Justify your answer with example. **[6]**

b) Explain the role of Mathematical Model in Business Intelligence. **[5]**

Total No. of Questions : 12]

SEAT No. :

P-6813

[Total No. of Pages : 2

[6183]-525

T.Y. M.C.A. (Engineering)

CLOUD COMPUTING

(2019 Pattern) (Semester - V) (510902)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right side indicate full marks.***
3) ***Assume Suitable data if necessary.***

Q1) a) Explain Cloud Characteristics with Architecture. **[6]**

b) Why API's is used in cloud services? **[6]**

OR

Q2) a) What are the different models for deployment in cloud computing? **[6]**

b) What is the platform as a service? **[6]**

Q3) a) What is the difference between cloud computing and mobile computing? **[6]**

b) Explain the features of PaaS and its benefits. **[6]**

OR

Q4) a) Explain what is the use of "EUCALYPTUS" in cloud computing? **[6]**

b) Which are the different layers that define cloud architecture? **[6]**

Q5) a) What is Virtualization? Explain Implementation Levels of Virtualization. **[6]**

b) What is the requirement of virtualization platform in implementing cloud? **[5]**

OR

Q6) a) Explain Virtualization of CPU, Memory, and I/O Devices. **[6]**

b) Explain Virtualization for Data-Center Automation. **[5]**

Q7) a) Explain how cloud resources are exchanged globally with a suitable example. **[6]**

b) Write Short notes on : **[6]**

i) Amazon cloud services

ii) Google cloud applications.

OR

Q8) a) What is resource provisioning? Explain various methods of resource provisioning. **[6]**

b) Explain the working of following cloud applications : **[6]**

i) Social Networking

ii) Google Apps

Q9) a) Explain the concept of hashing and digital signature in detail. **[6]**

b) What is Single Sign On (SSO)? Explain in detail. **[6]**

OR

Q10) a) Explain the following cloud security mechanisms. **[6]**

i) Public Key Infrastructure (PKI),

ii) Identity and Access Management (IAM).

b) Discuss various cloud issues like **[6]**

i) Stability

ii) Regulatory Issues

iii) Service level agreements.

Q11) a) Explain the concept of energy aware cloud computing. **[6]**

b) What is docker? Explain its architecture and workflow? **[5]**

OR

Q12) a) How cloud can be implemented in futuristic applications like intelligent fabrics and paints? Explain in detail. **[6]**

b) What is mobile cloud and multimedia cloud? Explain in detail. **[5]**

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Total No. of Questions : 12]

SEAT No. : ____

P-6814

[Total No. of Pages : 2

[6183]-526

T.Y. M.C.A. (Engineering)

SOFTWARE TESTING & QUALITY ASSURANCE

(2019 Pattern) (Semester - V) (510903)

Time : 3 Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right side indicate full marks.***
3) ***Assume suitable data if necessary.***

Q1) a) Explain the Components of the Software Quality Assurance System in details. **[6]**

b) Write a short note on : **[6]**

i) Capability Maturity Model Integration (CMMI)

ii) Six Sigma

OR

Q2) a) Define : **[6]**

i) Quality Assurance

ii) Quality Control

iii) Software Quality Assurance

b) Describe the planning for software quality assurance in details. **[6]**

Q3) a) What is Software Testing? Explain the Objectives of testing. **[6]**

b) Illustrate the Testing life cycle in details. **[6]**

OR

Q4) a) Explain the tester's role in a software development organization. **[6]**

b) List out the tabular difference between Verification and Validation. **[6]**

Q5) a) Write down the advantages of static testing by human. **[6]**

b) List out the features of white box testing. **[5]**

OR

P.T.O.

Q6) a) Elaborate the Cyclomatic complexity concept with suitable example. **[6]**

b) What are some of the limitations of black box testing? **[5]**

Q7) a) Write down a note on : **[6]**

i) Integration testing

ii) System and Acceptance testing

b) What are the basic feature to be considered for Usability and Accessibility Testing? **[6]**

OR

Q8) a) Explain GUI and Database Testing concept with example. **[6]**

b) Why do we Want to work in model validation in software development process? **[6]**

Q9) a) What is Automation Testing? What are the Skills needed for Automation Testing? **[6]**

b) List out the Challenges in Automation Tracking the Bug in the any system. **[6]**

OR

Q10) a) Describe the Architecture of Test Automation in details. **[6]**

b) Differentiate between manual testing and automated testing. **[6]**

Q11) a) What is Selenium? Explain its history in brief. **[6]**

b) Write a note on Selenium's Tool Suite. **[5]**

OR

Q12) a) Why testers should opt for Selenium rather than other testing tools. **[6]**

b) What are the basic considerations for designing a test automation strategy? **[5]**

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Total No. of Questions : 12]

SEAT No. : ____

P-6815

[Total No. of Pages : 5

[6183]-527

T.Y. M.C.A.

OPERATIONS RESEARCH

(2019 Pattern) (Semester - V) (510904)

Time : 2½Hours] ***[Max. Marks : 70***

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.***
4) ***Assume suitable data if necessary.***

SECTION - I

Q1) a) Solve the following linear programming problem by using Graphical method. **[7]**

Max $Z = 2 X_1 + X_2$

Subject to

$X_1 + 2 X_2 <= 10$

$X_1 + X_2 <= 6$

$X_1 - X_2 <= 2$

$X_1 - 2 X_2 <= 1$

$X_1, X_2 >= 0$

b) Find the dual of following primal. **[5]**

Max $Z = 3 X_1 + 5 X_2$

Subject to

$2 X_1 + 6 X_2 <= 50$

$3 X_1 + 2 X_2 <= 35$

$5 X_1 - 3 X_2 <= 10$

$X_2 <= 20$

$X_1, X_2, >= 0$

P.T.O.

OR

Q2) a) Solve the following linear programming problem using Big M simplex method. **[10]**

Min Z = 60 X + 80 Y

Subject to

X < = 400

Y > = 200

X + Y = 500

X, Y > = 0

b) Define the term feasible solution and optimal solution. **[2]**

Q3) a) Solve the following assignment problem. **[8]**

Jobs	Machines				
	A	B	C	D	E
1	11	17	8	16	20
2	9	7	12	6	15
3	13	16	15	12	16
4	21	24	17	28	26
5	14	10	12	11	13

b) What is Degeneracy in Transportation model? Explain. **[4]**

OR

Q4) Solve the following Transportation problem to find IBFS by **[12]**

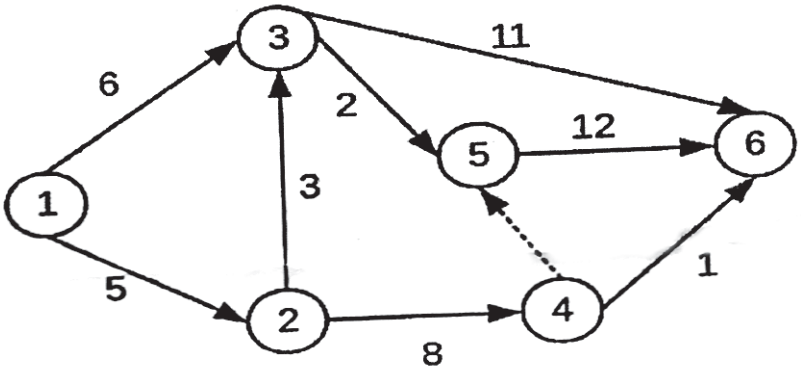
a) North west corner method

b) VAM

c) Least cost method

Sources /Destination	D_1	D_2	D_3	D_4	D_5	Supply
S_1	2	11	10	3	7	4
S_2	1	4	7	2	1	8
S_3	3	9	4	8	12	9
Demand	3	3	4	5	6	21

Q5) a) Determine the critical path for the following project network using forward and backward pass. **[8]**



b) Write short note on PERT. **[3]**

OR

Q6) a) In a factory there are seven jobs to perform, each of which should go through two machines A and B. The processing times (in hours) for the jobs are as given below. **[8]**

Determine the sequence of the jobs that will minimize the total elapsed time and also idle time of machines.

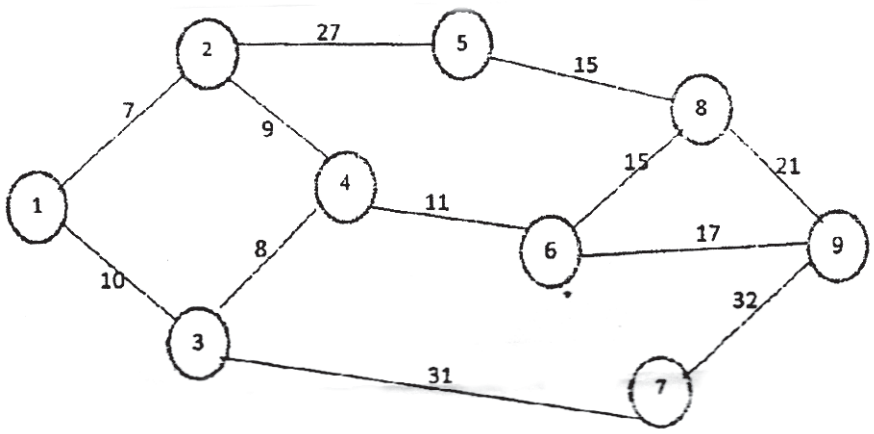
Machines	Jobs						
	1	2	3	4	5	6	7
A	3	12	15	6	10	11	9
B	8	10	10	6	12	1	3

b) Write short note on PERT. **[3]**

SECTION - II

Q7) a) Write algorithm of shortest path model by Flyod. **[5]**

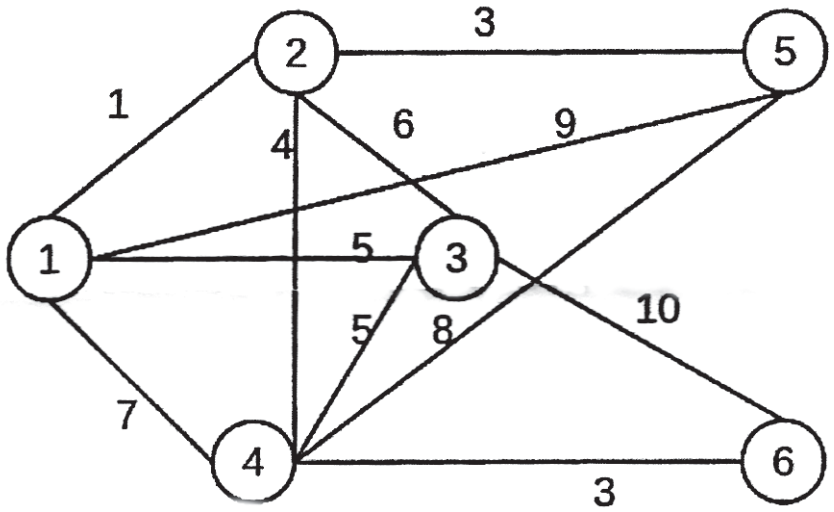
b) Find the shortest distance between node 1 to node 9 by using Dijkstra's algorithm for the given Distance network. **[7]**



OR

Q8) a) Write short note on Goal Programming. **[5]**

b) Draw the minimum spanning tree and calculate shortest distance. **[7]**



Q9) Estimated levels of scales (units) **[12]**

Strategies	N_1	N_2	N_3
S_1	7,00,000	3,00,000	1,50,000
S_2	5,00,000	4,50,000	0
S_3	3,00,000	3,00,000	3,00,000

Which strategy should be concern executive choose the basis of

a) Maximin b) Minimax

c) Maximax d) Laplace

OR

Q10)a) What is Decision Making Under Risk, Explain Expected value criterion. **[6]**

b) Explain Decision Making Under Certainty Using AHP. **[6]**

Q11)a) Explain the three most common methods for collecting observations in simulation. **[7]**

b) What are random numbers? Why they are called pseudo random. **[4]**

OR

Q12)a) What are merits and demerits of simulation? **[4]**

b) A bakery keeps stock of popular brand of cake. Previous experience shows that the daily demand pattern for the item with associated probabilities is given below. **[7]**

Daily Demand	0	10	20	30	40	50
Probability	0.01	0.20	0.15	0.50	0.12	0.02

Use the following sequence of random numbers to simulate the demand for next 10 days. Also the average demand per day.

Random no. : 25 39 65 76 12 05 73 89 19

▽▽▽▽

Total No. of Questions : 12]

SEAT No. :

P-6816

[Total No. of Pages : 2

[6183]-528

T.Y. M.C.A. (Engineering)

MACHINE LEARNING

(2019 Pattern) (Semester - V) (510905A)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) What is Machine learning? What is the need of it? Explain four examples of machine learning in detail? **[6]**

b) Compare Supervised and Unsupervised machine learning. **[6]**

OR

Q2) a) In Machine learning, what is need of dimensionality reduction? Describe factor analysis along with its application. **[6]**

b) Write a note on Principal Component Analysis. **[6]**

Q3) a) Differentiate between linear SVM and non-linear SVM. **[6]**

b) Explain Kernel methods for non-linearity. **[6]**

OR

Q4) a) Write a note on Multiclass classification. **[6]**

b) What are the support vectors and margins? Explain soft SVM and hard SVM. **[6]**

Q5) a) What is Overfitting and Underfitting in machine learning model? Explain with an example. **[6]**

b) How Ridge Regression help for regularizing linear models? **[5]**

OR

Q6) a) Explain the Lasso and Ridge types of regression. **[6]**

b) Elaborate Bias Variance dilemma. **[5]**

P.T.O.

Q7) a) What is the difference between K-means clustering algorithm and the K nearest neighbors KNN classification? **[6]**

b) Write a note on hierarchical clustering. **[6]**

OR

Q8) a) Explain Apriori algorithm in machine learning with example. **[6]**

b) Explain nearest neighbor classification in machine learning. **[6]**

Q9) a) What are the characteristics of a normal distribution? **[6]**

b) Write a note on Naïve Bayes Classifier. **[6]**

OR

Q10) a) Explain Expectation-Maximization methods in ML. **[6]**

b) Explain Discriminative Learning with Maximum Likelihood with respect to Machine Learning. **[6]**

Q11) a) What is ensemble learning? Explain types of ensemble learning? **[6]**

b) What is bagging and boosting in random forest? **[5]**

OR

Q12) a) Write a note on Reinforcement Learning. **[6]**

b) Write a note on Feed Forward Neural Networks. **[5]**

▽▽▽▽

Total No. of Questions : 12]

SEAT No. :

P-6817

[Total No. of Pages : 2

[6183]-529

T.Y. M.C.A. (Engineering)

BIG DATA ANALYTICS

(2019 Pattern) (Semester - V) (510905B) (Elective - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) What is Big Data? How big data is different from traditional data? **[6]**

b) List out different challenges of Big Data. **[6]**

OR

Q2) a) Discuss the use of Big Data Analytics in Business with suitable real world example. **[6]**

b) Short note on Business Intelligence. **[6]**

Q3) a) Briefly describe SVM-Support Vector Machine technique. **[6]**

b) Discuss Analysis of Variance (ANOVA) of correlation indicators of linear relationship. **[6]**

OR

Q4) a) Explain in details in which application k-means clustering can be used? **[6]**

b) Explain Apriori algorithms for frequent item set using candidate generation? **[6]**

Q5) a) Explain use of recommendation system in online marketing? **[6]**

b) Short note on direct discovery of communities in social networking? **[5]**

OR

Q6) a) Explain the paradigm of recommendation system with diagram? **[6]**

b) List the three types of classifiers. **[5]**

P.T.O.

Q7) a) Explain Conventional data visualization tools. **[6]**

b) What do you mean by "The science of data visualization"? **[6]**

OR

Q8) a) How do you use color in your data visualizations and why? How to handle the missing data? **[6]**

b) What is data validation? Name several data validation techniques? **[6]**

Q9) a) Generalize the list of tools related to Hadoop? **[6]**

b) Define HDFS. Explain HDFS in detail. **[6]**

OR

Q10) a) Explain Big data serialization formats. **[6]**

b) Explain the Storage Unit In Hadoop (HDFS)? **[6]**

Q11) a) What is Meta data? What information does it provide and explain the role of Name node in a HDFS clusters? **[6]**

b) Describe the working of Map reduce with a relevant example. **[5]**

OR

Q12) a) What are the advantages of Hadoop? Explain Hadoop architecture and its Components with proper diagram. **[6]**

b) What are the Limitations of Hadoop 1.0? **[5]**

▽▽▽▽

Total No. of Questions : 12]

SEAT No. :

P-6818

[Total No. of Pages : 2

[6183]-530

T.Y. M.C.A. (Engineering)

BLOCKCHAIN TECHNOLOGY

(2019 Pattern) (Semester - V) (510905C) (Elective - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Describe in detail - The consensus problem. **[6]**

b) 'Blockchain as a de-centralised web'-Comment. **[6]**

OR

Q2) a) How PoS works? Explain with diagram. **[6]**

b) Explain analysis of AAP protocol. **[6]**

Q3) a) Write a short note on Hashing. **[6]**

b) What is signature and encryption scheme? **[6]**

OR

Q4) a) Distinguish Public and Private Ledgers private ledger. **[6]**

b) Explain elliptic curve cryptography. **[6]**

Q5) a) What is Bitcoin? How bitcoin works. What are basic components of bitcoin? **[6]**

b) How does Merkle trees work? **[5]**

OR

Q6) a) What are the challenges of Bitcoin blockchain? **[6]**

b) Explain use and advantages of Bitcoin scripting language. **[5]**

P.T.O.

Q7) a) What is difference between Bitcon and Ethereum Blockchain? **[6]**

b) Write a short note on Solidity. **[6]**

OR

Q8) a) What is Smart Contracts? List some applications of Smart Contracts. **[6]**

b) Explain steps of Smart Contracts Development from a business perspective. **[6]**

Q9) a) What are the legal aspect with respect to cryptocurrency. **[6]**

b) How does black market impact on gobal economy? **[6]**

OR

Q10) a) Write a short note on future of blockchain. **[6]**

b) Explain the application of cryptocurrency in 'Medical Record Management System'. Assume suitable data. **[6]**

Q11) a) What is hyperledger fabric? **[6]**

b) Describe Sybil attacks and selfish mining in detail. **[5]**

OR

Q12) a) Explain zero knowledge proofs and protocols in blockchain. **[6]**

b) Write short note on SNARK. **[5]**

▽▽▽▽

Total No. of Questions : 12]

SEAT No. :

P-8661

[Total No. of Pages : 3

[6183]-541

F.Y. M.C.A. (Engineering)

DISCRETE MATHEMATICS AND STATISTICS

(2020 Pattern) (Semester - I) (310901)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right indicate full marks.***
3) ***Assume suitable data if necessary.***

Q1) a) How many integers between 1-500 are divisible by 2, 3, 5 or 7? **[6]**

b) Explain with example, notation used and mathematical expression to describe the following terms : **[6]**

i) Universal set ii) Subset

iii) Equality between sets iv) Union of sets

v) Power set vi) Power set

OR

Q2) a) Determine the whether the following expression is tautology, contradiction or contingency. **[6]**

i) $p \rightarrow ((q \vee r) \wedge (p \wedge q))$.

ii) $p \vee q \leftrightarrow (r \wedge q)$.

b) Prove that $(p \rightarrow (q \rightarrow r)) \Rightarrow (p \rightarrow q) \rightarrow (p \rightarrow r))$ **[6]**

Q3) a) Let A = {1, 2, 3, 4, 5, 6} and R = $\{x, y \parallel x-y \mid = 2\}$ Draw the Relation Matrix and Draw its Diagraph. **[6]**

b) Explain the following Terms with Example : **[6]**

i) Injective Function

ii) Bijective Function

iii) Surjective Function

OR

P.T.O.

Q4) a) Write the following statements in symbolic forms : **[6]**

i) If I finish my homework before dinner and it does not rain, then I will go to the ball game.

ii) I will go to a movie only if I will not study discrete structures.

iii) Either the food is good or service is good, but not both.

b) Let $f(x) = 2x+3$, $g(x) = 3x+4$, $h(x) = 4x$ for x € R, where R = set of all real numbers. Find gof, fog, foh, hof, goh. **[6]**

Q5) a) A box contains 6 white balls and 5 black balls. Find the number of ways 4 balls can be drawn from the box if i) two must be white, ii) all of them must have the same color. **[5]**

b) Solve the following : **[6]**

i) How many different car number plates are possible with 2 letters followed by 3 digits.

ii) How many of these number plates begin with 'MH'

OR

Q6) a) Four persons are chosen at random from a group containing 3 men, 2 women and 4 children. Find the chance that exactly two of them will be children. **[6]**

b) i) Suppose repetitions are not permitted, then how many 4 digit numbers can be formed from the six digits 1, 2, 3, 5, 7, 8?

ii) How many such a numbers are less than 4000?

iii) How many numbers in (i) are even?

iv) How many numbers in (ii) are odd?

v) How many of the numbers in (i) contain both the digits 3 and 5? **[5]**

Q7) a) List and Explain Axioms of Probability Every Data Scientist Should Know. **[6]**

b) How many different seven persons committee can be formed each containing 3 women from an available set of 20 women and 4 men from an available set of 30 men? **[6]**

OR

Q8) a) Define : **[6]**

i) Probability

ii) Sample space

iii) Event

b) In a class, there are 15 boys and 10 girls. Three students are selected at random. Find the probability that 1 girl and 2 boys are selected. **[6]**

Q9) a) What are the sampling methods or Sampling Techniques? Explain in detail. **[6]**

b) Find the variance and standard deviation for the following data : 57, 64, 43, 67, 49, 59, 44, 47,61, 59 **[6]**

OR

Q10) a) Explain the Types of Regression and their properties in detail. **[6]**

b) Explain Correlation Coefficient Types, Formulas with Examples. **[6]**

Q11) a) Find the expectation of a random variable X. Use the following data **[6]**

x	0	1	2	3
$f(x)$	1/6	2/6	2/6	1/6

b) What are the steps of hypothesis testing? Explain Five Steps in Hypothesis Testing. **[5]**

OR

Q12) a) In each of 4 races, the Democrats have a 60% chance of winning. Assuming that the races are independent of each other, what is the probability by using the Binomial Distribution that : **[6]**

i) The Democrats will win 0 races, 1 race, 2 races, 3 races, or all 4 races.

ii) The Democrats will win at least 1 race.

b) What are the three types of random variables? Explain in detail. **[5]**

Total No. of Questions : 12]

SEAT No. :

P-8662

[Total No. of Pages : 2

[6183]-542
F.Y. M.C.A (Engineering)
DATA STRUCTURES AND ALGORITHMS
(2020 Pattern) (Semester - I) (310902)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right side indicate full marks.***
3) ***Assume Suitable data if necessary***

Q1) a) Explain any one Linear & Non Linear Data Structure. **[6]**

b) Explain the Transpose of Matrix with example. **[6]**

OR

Q2) a) Explain the Triplet representation of Sparse Matrix **[6]**

b) Explain the term ADT with example. **[6]**

Q3) a) Write a C program to create a simple linked list with 3 nodes. **[6]**

b) Explain with example insertion of a node. **[6]**

OR

Q4) a) With the diagrammatic representation explain the addition of polynomial using Linked list **[8]**

i) $5x2 + 4x1 + 2x$

ii) $-5x1 - 5x$

b) How is the circular Linked List implementation? **[4]**

Q5) a) How the priority queue is implemented? **[6]**

b) Write a note on - Applications of Stack as a Data Structure **[5]**

OR

P.T.O.

Q6) a) Explain the code for insertion and deletion from Stack. **[6]**

b) Write a C program to implement Queue using array. **[5]**

Q7) a) List out the Applications of binary tree in details **[6]**

b) Write a program to search an element in a binary tree **[5]**

OR

Q8) a) Why we use the Dijkstra algorithm? **[6]**

b) Write a program to construct a binary search tree and print preorder traversal of it. **[5]**

Q9) a) Describe the concept of representation of graph -Adjacency matrix and Adjacency list with suitable examples. **[6]**

b) Write a program to find the height of the graph. **[6]**

OR

Q10) a) Write down the difference between depth first search and breadth first search **[6]**

b) List out the basic properties and applications of Graph in details **[6]**

Q11) a) Which sorting algorithm takes the least time when all elements of the input array are identical? Consider typical implementations of sorting algorithms. **[6]**

b) How would you use internal and external sorting examples? **[6]**

OR

Q12) a) Illustrate the stepwise working of Bubble Sort **[6]**

b) Write a program to find the largest three distinct elements in an array **[6]**

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Total No. of Questions : 12]

SEAT No. : ____

P-8663

[Total No. of Pages : 2

[6183]-543

F.Y. M.C.A. (Engineering)

OBJECT ORIENTED PROGRAMMING

(2020 Pattern) (Semester - I) (310903)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right side indicate full marks.***
3) ***Assume Suitable data if necessary.***

Q1) a) Describe the need of Object-Oriented Programming (OOP). **[6]**

b) Explain the basic concepts of Object-Oriented Programming and advantages of it. **[5]**

OR

Q2) a) List out the step of basic structure of C++ program. **[6]**

b) How Comments and header files work in any Object-Oriented Programming language. **[5]**

Q3) a) List out the various Data Types in C++ programming language with suitable examples. **[6]**

b) Write a C++ program to print employee details. **[6]**

OR

Q4) a) What is an inline function in C++? **[6]**

b) Write a note on static members and member functions in details. **[6]**

Q5) a) C++ Program to Addition of Complex Numbers Using Operator Overloading. **[6]**

b) What is inheritance? List out the various types of inheritance are get in C++. **[6]**

OR

P.T.O.

Q6) a) What is Polymorphism? What are the advantages of it. **[6]**

b) Write a tabular difference between function overloading and function overriding in detail. **[6]**

Q7) a) What is the use of Friend function, explain with example. **[6]**

b) What is virtual function? Why do we need virtual functions? **[5]**

OR

Q8) a) Illustrate the concept of dynamic binding with suitable example. **[6]**

b) Explain the concept of this pointer. **[5]**

Q9) a) How many types of templates are there in C++? Explain with example. **[6]**

b) Write a Program to find Largest among two numbers using function template. **[6]**

OR

Q10)a) Explain how exception handling mechanism can be used for debugging a program. **[6]**

b) What is generic programming? How is it implemented in C++? **[6]**

Q11)a) Discuss the various forms of get() function supported by the input stream. How are they used? **[6]**

b) What is a file mode? Describe the various file mode options available. **[6]**

OR

Q12)a) What is input stream and output stream? Explain various methods to open a file. **[6]**

b) Write a note on - seekg(), tellp(), getline(). **[6]**

Total No. of Questions : 12]

SEAT No. :

P-8664

[Total No. of Pages : 2

[6183]-544

F.Y. M.C.A. (Engineering)

SOFTWARE ENGINEERING & PROJECT MANAGEMENT

(2020 Pattern) (Semester - I) (310904)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right side indicate full marks.***
3) ***Assume suitable data if necessary.***

Q1) a) Explain Software Engineering Practices & Software Myths **[6]**

b) Explain in details Waterfall Model. **[6]**

OR

Q2) a) Differentiate between Verification and Validation. **[6]**

b) Explain in details Personal and Team Process Models. **[6]**

Q3) a) Explain elicitation, specification & validation in details. **[6]**

b) Explain scenario based modeling in Requirements Analysis. **[6]**

OR

Q4) a) Explain use case diagram and class diagram. **[6]**

b) Explain data modeling, data and control flow model. **[6]**

Q5) a) Explain agility principles. **[6]**

b) Explain agility and cost of change. **[5]**

OR

Q6) a) Explain SCRUM - process flow & scrum roles. **[6]**

b) Explain Agile manifesto. **[5]**

Q7) a) Discuss in details different software metrics with its use in software development? **[6]**

b) Explain Program Evaluation and Review Technique (PERT) with examples? **[6]**

P.T.O.

OR

Q8) a) What are the four methods of cost estimation? **[6]**

b) What is effort estimation in project management? Explain COCOMO model. **[6]**

Q9) a) Write short notes on Quality Control in software development. **[6]**

b) Discuss major steps in the risk management process. **[6]**

OR

Q10) a) Write note on importance of Risk monitoring and Mitigation process in software project development. **[6]**

b) Write short notes on : **[6]**

i) CPM ii) PERT

Q11) a) What is change control in software engineering? Explain with diagram 6 steps of it. **[6]**

b) Highlights the quality of leadership. **[5]**

OR

Q12) a) Discussed in details the principle of ethics. **[6]**

b) How decision making affects the development and final product explain with proper example? **[5]**

Total No. of Questions : 12]

SEAT No. :

P-9713

[Total No. of Pages : 2

[6183]-545-A

F.Y. M.C.A. (Engineering)

INFORMATION SYSTEMS AND ENGINEERING ECONOMICS

(2020 Pattern) (Semester - I) (310905)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right side indicate full marks.***
3) ***Assume suitable data if necessary.***

Q1) a) Distinguish between MOA and AOA. **[6]**

b) Explain the functions of management. **[6]**

OR

Q2) a) Explain Line and Staff organization with diagram. **[6]**

b) Explain role of Information system in e-commerce organization. **[6]**

Q3) a) Write short note on Knowledge management system. **[6]**

b) Explain advantages of Business process integration. **[6]**

OR

Q4) a) Discuss Unique Identification Authority of India (UIDAI) with reference to E-governance. **[6]**

b) Explain advantages of cloud based ERP implementation. **[6]**

Q5) a) Explain applications of MIS. **[6]**

b) Write short note on Customer Relationship Management. **[5]**

OR

Q6) a) Discuss the role of MIS in education systems. **[6]**

b) Write short note on Supply Chain Management. **[5]**

Q7) a) Explain Simpson's Model for decision making. **[6]**

b) Explain Open system and Closed system in managerial decision making environment. **[6]**

P.T.O.

OR

Q8) a) Write short note on principle of rationality/bounded rationality. **[6]**

b) Explain with example decision making under uncertainity. **[6]**

Q9) a) Write a note on Elements of cost. **[6]**

b) What is Petty Cash Book? State different types of Petty Cash Book. **[6]**

OR

Q10) a) Explain in detail classification of overhead with example. **[6]**

b) What is Balance Sheet and what purpose does it fulfil? **[6]**

Q11) a) Explain the importance of Ratio analysis. **[6]**

b) A company proposes to introduce a new product in the market. The company wants to maintain P/V Ratio at 25%. If variable cost of the product is Rs. 300. What will be the Selling price? **[5]**

OR

Q12) a) What is marginal costing? What are its features? **[6]**

b) ABC Company produces a single article. Following Cost data is given about its product. **[5]**

Selling Price per unit Rs. 40

Marginal cost per unit Rs. 24

Fixed cost per annum Rs. 16000

Calculate PV ratio, Break even sales.

Total No. of Questions : 12]

SEAT No. : ____

P-8665

[Total No. of Pages : 2

[6183]-546
F.Y. M.C.A. (Engineering)
DATA BASE MANAGEMENT SYSTEM
(2020 Course) (Semester - II) (310912)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates :

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right side indicate full marks.***
3) ***Assume Suitable data if necessary.***

Q1) a) Explain database schema and instances with example. **[6]**

b) Explain the concept of view of data. **[6]**

OR

Q2) a) Explain DDL and DML statements with student database. **[6]**

b) Elaborate difference between File system and DBMS. **[6]**

Q3) a) Explain clauses with employee database as an example. **[6]**

b) Write a cursor which will update the employee salary by 15000 and display the count of employees received the increment. **[6]**

OR

Q4) a) Explain keywords in SQL **[6]**

b) Write an explicit cursor which will display employee number and name of all employees make use of the EMP table

EMP (Empno, Ename, Job, Mgr, Hiredate, Sal, Comm, Deptno) **[6]**

Q5) a) What are constraints? Explain Different types of constraints in detail? **[6]**

b) Explain any 5 CODD's rules in detail? **[5]**

OR

P.T.O.

Q6) a) What is normalization? Explain all types of normalization. **[6]**

b) State the features of good relational design. **[5]**

Q7) a) What is realtime timestamping? Explain with proper example. **[6]**

b) What is transaction management? **[5]**

OR

Q8) a) Explain concept of cascaded rollbacks. **[8]**

b) Explain Shadow Paging. **[3]**

Q9) a) Explain Parallel databases with its types. **[6]**

b) Write a short note on Speed up and Scale up. **[6]**

OR

Q10) a) Explain Lock compatibility matrix. **[8]**

b) Explain Distributed database system. **[4]**

Q11) a) Explain how to deal with massive datasets using Map Reduce and Hadoop. **[6]**

b) Explain working of different nodes in HDFS. **[6]**

OR

Q12) a) Explain CRUD operation in Mango DB. **[6]**

b) Explain the concept of Indexing in Mango DB. **[6]**

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Total No. of Questions : 12]

SEAT No. :

P-8666

[Total No. of Pages : 2

[6183]-547

F.Y. M.C.A. (Engineering)

COMPUTER NETWORK

(2020 Pattern) (Semester - II) (310913)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right side indicate full marks.***
3) ***Assume Suitable data if necessary.***

Q1) a) What is computer network? Explain different types of it. **[6]**

b) Explain 7 layers of OSI model in detail. **[6]**

OR

Q2) a) Define topology. Give various types of it. **[6]**

b) Write a short note on : **[6]**

i) FHSS

ii) DSSS

Q3) a) Explain different services provided by Data link layer. **[6]**

b) Explain working of Stop & Wait protocol. **[6]**

OR

Q4) a) Explain error control techniques in detail. **[6]**

b) What are the different fields in HDLC frame? Explain in detail. **[6]**

Q5) a) Explain channel allocation in computer network. **[6]**

b) What is ALOHA? Explain types of it. **[5]**

OR

Q6) a) Differentiate between CSMA/CA and CSMA/CD. **[6]**

b) Write a short note on Gigabit Ethernet. **[5]**

P.T.O.

Q7) a) Explain various frmctions of Network Layer. **[6]**

b) Write a note on IPv4 & IPv6 addressing. **[6]**

OR

Q8) a) Explain the term subnetting with example. **[6]**

b) Write a note on : **[6]**

i) Distance Vector Protocol

ii) OSPF

Q9) a) Differentiate TCP & UDP. **[6]**

b) Explain the functions of Transport Layer. **[6]**

OR

Q10) a) Write a note on Closed Loop Conjunction. **[6]**

b) Write a note on RTP, SCTP. **[6]**

Q11) a) How DNS works? **[6]**

b) Explain the role of SMTP in application layer. **[5]**

OR

Q12) a) Explain functions of Application layer in networking. **[6]**

b) Explain the working of SNMP. **[5]**

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Total No. of Questions : 12]

SEAT No. :

P-8667

[Total No. of Pages : 2

[6183]-548
F.Y. MCA (Engineering)
JAVA PROGRAMMING
(2020 Pattern) (Semester - II) (310914)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates :

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right indicate full marks.***
3) ***Assume suitable data,if necessary.***

Q1) a) Write down how to crate and Run Java Programs using Command Line Arguments and IDE. **[6]**

b) List out and explain in detail types of packages in java with Example. **[6]**

OR

Q2) a) Briefly discuss why the name as given JAVA? Explain the Java Teriminology and features of Java in detail. **[6]**

b) How does JVM Handle an Exception explain with suitable example. **[6]**

Q3) a) What is thread in JAVA? What is multithreading? Write down the priority of thread in details. **[6]**

b) List out any six important classes in Java.io package explain with examples. **[6]**

OR

Q4) a) Explain java-io.File class **[6]**

b) What is Java BufferedWriter Class?Write a Class declaration,Class constructors and class methods of BufferedWriter Class. **[6]**

Q5) a) Define Applet.Explain Life cycle of an applet. **[6]**

b) What is an use of appletviewer in Java? How to create your own Applet program? **[5]**

OR

P.T.O.

Q6) a) Write a program in JAVA AWT in which we have shown an AWT component button by setting its placement and window frame size. **[6]**

b) Differntiate between AWT and Swing in detail with example. **[5]**

Q7) a) Explain types of JDBC Drivers **[6]**

b) Write note on J2EE. **[6]**

OR

Q8) a) Write a program to create database of employee using information such as name,id,designation, date of joining etc.Program should display list all the employees. .**[6]**

b) Explain JDBC Architecture **[6]**

Q9) a) Write a note on java net-networking classes and interfaces **[6]**

b) What is Datagrams? Explain Datagram packet concept in details. **[6]**

OR

Q10) a) Write a client-Server Socket program.Client program will accept the string from user and send to the server. Server will count the number of vowels from string and send it to client. **[6]**

b) Explain URL connections in details. **[6]**

Q11) a) Describe the life cycle of servlet in details. **[6]**

b) Demonstrate how to Handle HTTP Get request from server. **[5]**

OR

Q12) a) What is JSP? Write down how to add Dynamic contents via expressions. **[6]**

b) Demonstrate how to Handle HTTP POST Request from server. **[5]**

Total No. of Questions : 12]

SEAT No. : ____

P-8668

[Total No. of Pages : 2

[6183]-549

F.Y. M.C.A. (Engineering)

OPERATING SYSTEMS

(2020 Pattern) (Semester - II) (310915)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right side indicate full marks.***
3) ***Assume Suitable data if necessary.***

Q1) a) What is kernel? Explain its main function. What relationship with operating system? **[6]**

b) Describe evolution of operating system. **[6]**

OR

Q2) a) What is an operating system and why do we need it? Describe the two main goal operating system. **[6]**

b) What is BASH Scripting. List advantages and disadvantages of BASH scripting. **[6]**

Q3) a) Explain round robin scheduling. Give the example of preemptive round robin scheduling. **[6]**

b) What is a thread? Define User Level Thread and Kernel Level Thread. **[6]**

OR

Q4) a) What are the different scheduling criteria for process scheduling? **[6]**

b) What are the types of schedulers? Explain them with suitable diagram? **[6]**

Q5) a) Describe semaphore and monitor. **[6]**

b) Explain bounded buffer problem of mutual exclusion. **[5]**

OR

P.T.O.

Q6) a) What are the deadlock detection and prevention techniques? **[6]**

b) Describe Mutual Exclusion and its requirements. **[5]**

Q7) a) Page reference string is - 0,5,1,5,2,5,3,5,2,5,0,5 Apply the Second Chance Replacement policy. (3 Frames) Find the page fault **[6]**

b) Explain with example - Best Fit, Worst Fit & First Fit. **[6]**

OR

Q8) a) Explain with example Belady's Anomaly. **[6]**

b) Apply the policy Optimal Page and Least Recently Used for the following reference string - 2,3,4,2,1,3,7,5,4,3 with 3 frames. Justify your answer. Find page fault. **[6]**

Q9) a) Write a note on Disk Structure. **[6]**

b) Explain SSTF when track request - 95,180,34,119,11,123,62,64. Starting from Track no. 50 **[6]**

OR

Q10)a) Apply the C-Look and C-Scan disk scheduling algorithms for the request queue. 95, 180 , 34 , 119 , 11 , 123 ,62, 64 (Total Tracks 200, initial position is 125) Calculate total head movements. **[6]**

b) Explain with example any three File Allocation Methods. **[6]**

Q11)a) Explain the 6 stages of Linux Booting Process. **[6]**

b) Write a note on Inter-process communication in LINUX. **[5]**

OR

Q12)a) Explain the Real Time Process scheduling in Linux. **[5]**

b) Explain the types of files in Linux along with any 3 file management commands. **[6]**

Total No. of Questions : 12]

SEAT No. :

P-8669

[Total No. of Pages : 2

[6183]-550

F.Y. M.C.A. (Engineering)

MOBILE COMPUTING

(2020 Pattern) (Semester - II) (310916A) (Elective - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q no. 1 or Q2, Q No. 3 or 4, Q No. 5 or 6, Q No. 7 or 8, Q No. 9 or 10 and Q No. 11 or 12.***
2) ***Figures to the right side indicate full marks.***
3) ***Assume Suitable data if necessary.***
4) ***Neat diagrams must be drawn wherever necessary.***

Q1) a) What is a channel? How are channels allocated in a cellular scenario? **[6]**

b) List out the advantages of SQLite? And explain List out the areas where SQLite works well? **[6]**

OR

Q2) a) What are the main disadvantages of Mobile Computing? **[6]**

b) Explain Value Added Services of mobile devices. **[6]**

Q3) a) Explain WAP protocol. **[6]**

b) Explain MAC issues in wireless networking. **[6]**

OR

Q4) a) Explain WAP Architecture. **[6]**

b) What are the advantages of Wireless Networks? Classify different wireless networks based on their range. **[6]**

Q5) a) Explain File system of mobile data management system. **[6]**

b) Explain adaptive clustering for mobile wireless networks. **[5]**

OR

Q6) a) What is data replication for mobile computers. **[6]**

b) Explain issues of mobile data management. **[5]**

P.T.O.

Q7) a) Explain Features of android. **[6]**

b) Why Develop for Android? **[6]**

OR

Q8) a) Explain Android development in detail. **[6]**

b) Explain Architecture of Android. **[6]**

Q9) a) Explain file structure in android O.S. **[6]**

b) Explain the location-based services. **[6]**

OR

Q10) a) Explain Android Applicatios. **[6]**

b) Explain Advantages of retrieval and sharing of File system in android. **[6]**

Q11) a) Write a short note on Blue tooth? How it can access in android? **[6]**

b) Explain in brief Peer to peer to communication. **[5]**

OR

Q12) a) How Sensor Manager works? **[6]**

b) Explain Security of Mobile Application. **[5]**

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Total No. of Questions : 12]

SEAT No. :

P8670

[Total No. of Pages : 2

[6183]-551
F.Y. M.C.A. (Engineering)
ARTIFICIAL INTELLIGENCE
(2020 Pattern) (Semester - II) (310916 B) (Elective - I)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Define artificial intelligence and elaborate the applications of artificial intelligence in the real world. **[6]**

b) Explain the concept of Intelligent Agent. **[6]**

OR

Q2) a) What is Rationality? Explain the concept of nature of environment. **[6]**

b) Explain the structure of Agent? Explain how the components of agent program works. **[6]**

Q3) a) Differentiate between uninformed and informed search methods. **[6]**

b) Explain iterative deepening depth first search (IDDFS) and justify its parameters based on time complexity, space complexity. **[6]**

OR

Q4) a) Compare and explain Depth First search and Breadth First search methods. **[6]**

b) With an example explain A* algorithm. State the properties of A* algorithm. **[6]**

Q5) a) Explain the properties for knowledge representation system. **[6]**

b) What are the drawbacks of propositional logic used in representation of facts? **[5]**

OR

P.T.O.

Q6) a) Explain different Facets of Knowledge with examples. **[6]**

b) Represent the following sentences into formulas in predicate logic, **[5]**

i) John likes all kinds of food

ii) Apples are food

iii) Chicken are food

iv) Anything anyone eats and isn't killed by is food.

v) Bill eats peanuts and is still alive

Q7) a) What is the role of Planning in Artificial Intelligence? Explain Types of planning in detail. **[6]**

b) What is Non Linear planning? Explain constraint posting in detail. **[6]**

OR

Q8) a) Write difference between search and planning in AI. **[6]**

b) Explain hierarchical planning in detail. **[6]**

Q9) a) What is Artificial Neural network? Explain its component in detail. **[6]**

b) Explain Feedforward neural networks in detail. **[6]**

OR

Q10)a) Explain working of back propogation algorithm. **[6]**

b) Describe various applications of neural network. **[6]**

Q11)a) What is expert system? Explain components of expert system in detail. **[6]**

b) Explain utilization and functionality of expert system. **[5]**

OR

Q12)a) Explain the architecture of Expert systems. **[6]**

b) Explain the steps required for building expert system. **[5]**

♦ ♦ ♦

Total No. of Questions : 12] **SEAT No. :**

P8671 **[Total No. of Pages : 2**

[6183]-552
First Year M.C.A. (Engineering)
CYBER SECURITY
(2020 Pattern) (Semester - II) (310916 C) (Elective - I)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) List out and Explain any six challenges for internet governance in detail. **[6]**

b) Explain NCSP 2013 for Securing E-Governance services in Detail. **[6]**

OR

Q2) a) Explain in detail the need for an International convention on cyberspace with respect to high-level panel on digital cooperation. **[6]**

b) Explain the difference between cybercrime, cyber terrorism and cyber warfare in detail. **[6]**

Q3) a) Explain any five cyber security safeguards to protect your data while employees work from Home. **[6]**

b) What are the key concepts of ethical hacking explain which four key protocol concepts used by Hacking experts. **[6]**

OR

Q4) a) What is Denial of Service Filters? Explain the Types of Denial of Service Attacks in detail. **[6]**

b) What is a firewall? Explain Types of Firewalls in detail. **[6]**

Q5) a) Explain the four primary types of IDPS technologies in detail. **[6]**

b) What is antimalware (anti-malware)? Explain any two Best Antivirus Programs for Ubuntu. **[5]**

OR

P.T.O.

Q6) a) Explain any five major elements of information security management in detail. **[6]**

b) What is Network Traffic Analysis (NTA)? Explain any four use cases for analyzing and monitoring network traffic. **[5]**

Q7) a) Explain Symmetric key Cryptography and Asymmetric key Cryptography. **[6]**

b) Explain Message Authentication and Digital Signatures. **[6]**

OR

Q8) a) Explain Cryptography and Applications of Cryptography. **[6]**

b) Explain the VPN Security Protocols. **[6]**

Q9) a) Explain Cyber Security regulations. **[6]**

b) Explain the state and Private Sector in Cyberspace. **[6]**

OR

Q10)a) Describe Cyber security standards. **[6]**

b) Discuss Cyber security policy 2013. **[6]**

Q11)a) Explain Cyber forensics in detail. **[6]**

b) Explain Investigating Information-hiding in cyber forensics. **[5]**

OR

Q12)a) Explain Tracing Internet access and Tracing memory in real - time. **[6]**

b) How to Validating E-mail header information in cyber forensics. **[5]**

Total No. of Questions : 12]

SEAT No. :

P8672

[Total No. of Pages : 2

[6183]-553
First Year M.C.A. (Engineering)
BLOCK CHAIN
(2020 Pattern) (Semester - II) (310916 D) (Elective - I)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) What is Distributed Database? Explain it types. **[6]**

b) Write about ECDSA digital signature in detail. **[6]**

OR

Q2) a) Explain about Byzantine General problem and its fault tolerance. **[6]**

b) Write a short note on Zero Knowledge Proof. **[6]**

Q3) a) What are merkle trees? How important are merkle trees in blockchains? **[6]**

b) Differentiate between public and private blockchain. **[6]**

OR

Q4) a) State different types of consensus and fork with an example. **[6]**

b) Explain the advantages of Blockchains over distributed database. **[6]**

Q5) a) Differentiate between consensus algorithms : Proof of Work (PoW), Proof of Stake (PoS). **[6]**

b) What are Sybil attacks and how do blockchain mitigate them? **[5]**

OR

Q6) a) Explain Nakomoto consensus algorithm. **[6]**

b) Explain Energy Utilization in detail. **[5]**

Q7) a) Write a short note on history of crypto currency. **[6]**

b) Explain Smart contracts and how they are used in Ethereum? **[6]**

OR

Q8) a) List the components of Hyperledger and Ethereum tools helpful in creating a blockchain network with an example. **[6]**

b) Differentiate between bitcoins and traditional currencies. **[6]**

Q9) a) Write a short note on Stakeholders in Cryptocurrency. **[6]**

b) What impact does the black market have on the global economy? **[6]**

OR

Q10)a) Mention the challenges of IOT based medical health care system. **[6]**

b) Explain in detail about the issues related to legal issues of cryptocurrency. **[6]**

Q11)a) Explain in brief Hyperledger along with its Architecture. **[6]**

b) Write a short note on Domain Name Service. **[5]**

OR

Q12)a) What are the different types of Chaincode in Hyperledger fabric? **[6]**

b) Explain in the following terms in brief with respect to Hyperledger fabric: **[5]**

i) Membership

ii) Transactions

Total No. of Questions : 12]

SEAT No. :

P8673

[Total No. of Pages : 3

[6183]-555
S.Y. M.C.A. (Engineering)
DATA SCIENCE
(2020 Pattern) (Semester - III) (410901)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) State the characteristics of big data? Discuss various formats of data in respect to Big data? **[6]**

b) Explain the steps to be followed to deploy a Big Data solution with proper example. **[6]**

OR

Q2) a) Differentiate between relational databases and Big data with respect to generation, storage and processing. **[6]**

b) What is the importance of Data Scientist in the growth of industry? List out major task of Data scientist. **[6]**

Q3) a) With respect to Data warehouse explain following terms with suitable example: **[6]**

i) Data warehouse

ii) Data Lake

iii) Data Mart

iv) Databases

v) Dimensional Table

vi) Fact Table

b) State the difference between OLTP and OLAP. **[6]**

OR

P.T.O.

Q4) a) Why data pre processing is important in data analysis? Explain different methods of data pre processing? **[6]**

b) What is the difference between ER Modeling vs. Dimensional Modeling? **[6]**

Q5) a) Explain with neat diagram the working of Neural Network Classifiers.**[6]**

b) Differentiate between the data analytics classification and clustering techniques? **[5]**

OR

Q6) a) Explain Naive Bayes theorem used for data classification? **[6]**

b) List 4 common metrics for evaluating classifier performance with suitable example. **[5]**

Q7) a) Write working of FP-Growth algorithm? Explain why FP-Growth is better than Apriori algorithm? **[6]**

b) Explain any 6 applications of association rule mining? **[6]**

OR

Q8) a) The 'database' below has four transactions. What association rules can be found in this set, if the minimum support (i.e coverage) is 60% and the minimum confidence (i.e. accuracy) is 80%? **[6]**

Trans_id	Itemlist
T1	{K, A, D, B}
T2	{D, A, C, E, B}
T3	{C, A, B, E}
T4	{B, A, D}

b) Explain steps of frequent pattern mining algorithm with supermarket management example. **[6]**

Q9) a) Explain K-means clustering algorithm with example and neat diagram.**[6]**

b) What is Euclidean and Manhatten distance? Explain with formula and diagram. **[6]**

OR

Q10)a) Explain hierarchical clustering with suitable example. **[6]**

b) What is outlier detection? How to detect outlier using density based clustering algorithm? **[6]**

Q11)a) How data visualization plays important role in data analysis? Explain how bar chart and Pie chart use in data visualization with diagram? **[6]**

b) How can color of an object be defined? Explain how color is important in Visualization Design. **[5]**

OR

Q12)a) Write use and importance of following chart types in data analysis. **[6]**

i) Histogram

ii) Waterfall Chart

iii) Tree map chart

iv) Line chart

v) Doughnut Chart

vi) Area Chart

b) Explain benefits of data visualization in business or enterprises for overall development? **[5]**

Total No. of Questions : 12] **SEAT No. :**

P8674 **[Total No. of Pages : 2**

[6183]-556
S.Y. M.C.A. (Engineering)
WEB TECHNOLOGIES
(2020 Pattern) (Semester - III) (410902)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Write the structure of HTML. **[6]**

b) Write the difference between XHTML and HTML. **[6]**

OR

Q2) a) What is Client-Server Communication? **[6]**

b) List out some of Basic Internet Protocols. **[6]**

Q3) a) Differentiate between Java and JavaScript. **[6]**

b) Write the various approaches of CSS. List properties of CSS. **[6]**

OR

Q4) a) Write the difference between linked and Embedded Style Sheet. **[6]**

b) How to declaring the variable in Java Script? Write the syntax for Java Script. **[6]**

Q5) a) Explain control strutures in java? **[6]**

b) List out five JavaScript Array properties with suitable example? **[5]**

OR

Q6) a) Write 3 Loop controls in java? Explain with syntax and example. **[6]**

b) Differentiate between cookies and events on web pages? **[5]**

P.T.O.

Q7) a) Explain MVC Architecture in detail. **[6]**

b) What are the different parts of Angular JS? Explain in detail. **[6]**

OR

Q8) a) Explain in detail forms in Angular JS. **[6]**

b) How AngularJS Integrates with HTML? Elaborate with an example. **[6]**

Q9) a) With the help of simple program show how to take and user input in PHP. **[6]**

b) Explain library function for array manipulations in PHP. **[6]**

OR

Q10)a) What if File Handling in PHP? Explain any 5 file handing methods in the context with PHP. **[6]**

b) Explain OOP features in context with PHP. **[6]**

Q11)a) Explain features of ASP. NET. **[6]**

b) Explain ASP. NET page creation. **[5]**

OR

Q12)a) Explain Life cycle of ASP.NET with the help of diagram. **[6]**

b) Explain database connectivity in ASP. NET with a simple program. **[5]**

Total No. of Questions : 12]

SEAT No. :

P8675

[Total No. of Pages : 2

[6183]-557
S.Y. M.C.A. (Engineering)
CLOUD COMPUTING
(2020 Pattern) (Semester - III) (410903)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4,Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or .Q12.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume Sutible data if necessary.***

Q1) a) What is Cloud? Explain the Cloud Characteristics. **[6]**

b) Explain the Cloud computing architecture. **[6]**

OR

Q2) a) Explain the client-server model in Cloud Computing. **[6]**

b) Explain the P-to-P Computing. **[6]**

Q3) a) Explain the Software as a Service (SaaS). **[6]**

b) Explain the Platform as a Service (Paas). **[6]**

OR

Q4) a) Explain the Comparison of various cloud computing providers/Softwares. **[6]**

b) Explain the DBaaS (Database as services). **[6]**

Q5) a) Explain the Implementation Levels of Virtualization. **[6]**

b) Explain the Virtualization Structures/Tools and Mechanisms. **[5]**

OR

Q6) a) Explain the Virtual Clusters and Resource Management. **[6]**

b) Explain the Virtualization of CPU. **[5]**

P.T.O.

Q7) a) What are the Resource Provisioning Methods in Cloud? **[6]**

b) What is Inter Cloud Resource Management? **[6]**

OR

Q8) a) What is the diffference between AWS Google and Microsoft Azure? **[6]**

b) Difference between AWS, Azure, and Google Cloud Platform. **[6]**

Q9) a) What are Cloud Security Types? **[6]**

b) What are the four areas of Cloud Security? **[6]**

OR

Q10)a) How does Cloud Security Work? **[6]**

b) What are the 3 categories of cloud security? **[6]**

Q11)a) Is cloud computing a good carrer for future? **[6]**

b) Why companies embrace docker. **[5]**

OR

Q12)a) How the Cloud Will Change Operating Systems? **[6]**

b) What is docker in cloud computing? How does docker work. **[5]**

Total No. of Questions : 12]

SEAT No. :

P8676

[Total No. of Pages : 2

[6183]-558

S.Y. M.C.A. (Engineering)

SOFTWARE TESTING AND QUALITY ASSURANCE

(2020 Pattern) (Semester - III) (410905)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4,Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or .Q12.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume Sutible data if necessary.***

Q1) a) Explain the following terms: **[6]**

i) Software Quality

ii) Quality assurance

iii) Quality control

b) Write a short note on Six sigma model to be used in software development process. **[6]**

OR

Q2) a) What are components of software quality assurance system? **[6]**

b) Write a short note on ISO 9000 series quality assurance. **[6]**

Q3) a) Write test plan for coffee vending machine. **[6]**

b) Elaborate the usage of defect repository in details. **[6]**

OR

Q4) a) Write test plan for ATM system. **[6]**

b) Explain defect classes. **[6]**

Q5) a) Explain the use of boundary value analysis with suitable example. **[6]**

b) What is requirement based testing? When to use this type of testing? What are the advantages of it? **[5]**

OR

Q6) a) Explain positive and negative testing with suitable example. **[6]**

b) Describe the graph based testing any real life example. **[5]**

P.T.O.

Q7) a) What is integration testing? What is the difference between top down and bottom up integration? **[6]**

b) What is performance testing? Which are the different factors considered in performance testing? **[6]**

OR

Q8) a) What is regression testing? Explain different types of regression testing with sutiable example. **[6]**

b) Explain usability testing and security testing? **[6]**

Q9) a) What is automation testing? Explain different automation tools for software testing? **[6]**

b) Explain difference between automated testing and manual testing. **[6]**

OR

Q10)a) List out the various types of open source and paid automation tools you are aware with suitable parameter to be consider and compare it. **[6]**

b) When do you prefer manual testing over automation testing? **[6]**

Q11)a) What is Selenium? What are the different selenium components? **[6]**

b) Write short note on - Selenium IDE. **[5]**

OR

Q12)a) List out the limitations of Selenium testing tool. **[6]**

b) What is Selenium? How is it classified? **[5]**

Total No. of Questions : 12]

SEAT No. :

P8677

[Total No. of Pages : 2

[6183]-559
S.Y. M.C.A. (Engineering)
BIG DATA ANALYTICS
(2020 Pattern) (Semester - III) (Elective - II) (410904A)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4,Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or .Q12.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume Sutible data if necessary.***

Q1) a) Define and Introduce Big Data. What are the Benefits of Big Data? Enlist the challenges to Big Data? **[6]**

b) Define Big Data Analytics. Explain state of practice in Big Data Analytics. **[6]**

OR

Q2) a) List the reasons why data to be cleaned before use? List out data cleaning methods. **[6]**

b) Explain Data Analytics life cycle. **[6]**

Q3) a) What are association rules? Give example. **[6]**

b) Explain the basic working of density based clustering mechanism? **[6]**

OR

Q4) a) What are the different types of machine Learning Algorithm? Explain clustering - Unsupervised Machine Learning Algorithm. **[6]**

b) Explain Linear Regression Algorithm of Supervised Machine Learning Algorithm. **[6]**

Q5) a) Explain Recommendation based on User Ratings using appropriate example. **[6]**

b) Differentiate collaborative filtering and content based systems. **[5]**

OR

Q6) a) Explain collaborative filtering based recommendation system. **[6]**

b) Differentiate between lexical similarity and semantic similarity of documents. **[5]**

P.T.O.

Q7) a) Mention different R tools used in data visulization? **[6]**

b) Write short notes on graph database. **[6]**

OR

Q8) a) Name the four highlighted window panes of R Studio graphical user interface. **[6]**

b) What is histogram? How it is useful to predict the analysis of data? **[6]**

Q9) a) What is NoSQL? What are the advantages of NoSQL data systems? **[6]**

b) Explain attributes of Map and Reduce phase. **[6]**

OR

Q10)a) Enlist Hadoop MapReduce entities with their working and explain four main data processing stages of Hadoop MapReduce. Also write its limitations. **[6]**

b) Describe Hadoop MapReduce fundamentals. **[6]**

Q11)a) Explain HDFS and MapReduce Architecture with all its components. Plot HDFS and MapReduce together. **[6]**

b) What are the different Hadoop modes. **[5]**

OR

Q12)a) List the key computing resources commonly used on different applications and frameworks with explanation of it? **[6]**

b) Write short note on HDFS. **[5]**

Total No. of Questions : 12]

SEAT No. :

P8678

[Total No. of Pages : 2

[6183]-560
S.Y. M.C.A. (Engineering)
MACHINE LEARNING
(2020 Course) (Semester - III) (410904B)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4,Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or .Q12.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume Sutible data if necessary.***

Q1) a) Explain any two applications of Machine Learning. **[6]**

b) What is Principal Component Analysis? Why do we use it? **[6]**

OR

Q2) a) Distinguish between supervised and unsupervised learning. **[6]**

b) Write short note on - Dimensionality reduction in machine learning. **[6]**

Q3) a) Short note on - Support Vector Machine. **[6]**

b) What is the difference between One vs One and One vs Rest. **[6]**

OR

Q4) a) What are different kernels in Support Vector Machine. **[6]**

b) Explain F1 score in binary classification. **[6]**

Q5) a) What is the difference between Classification and Regression. Explain with example. **[6]**

b) What is Bias in machine learning? **[5]**

OR

Q6) a) Explain overfitting and underfitting with example. **[6]**

b) What is 'training set' and 'test set' in machine learning. **[5]**

P.T.O.

Q7) a) Differentiate between Clustering and Classification. **[4]**

b) Explain Distance based models. **[8]**

OR

Q8) a) Explain Association rule mining. Comment on role of support and confidence in association rule mining. **[7]**

b) Explain Tree based models. **[5]**

Q9) a) Explain Probabilistic Model. **[6]**

b) Explain Naïve Bayes Classifier. **[6]**

OR

Q10)a) Explain Discriminative learning in Machine Learning. **[6]**

b) Define Normal Distribution and its geometric interpretation. **[6]**

Q11)a) Define ensemble learning in machine learning. Where it is use. **[6]**

b) Describe Reinforcemeter Learning with example. **[5]**

OR

Q12)a) Explain Feed Forward Neural Network. **[6]**

b) Define Deep Learning. Advantages and applications. **[5]**

Total No. of Questions : 12]

SEAT No. :

P8679

[Total No. of Pages : 2

[6183]-561

S.Y. M.C.A. (Engineering)

OBJECT ORIENTED ANALYSIS AND DESIGN

(2020 Pattern) (Semester - III) (Elective - II) (410904C)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4,Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or .Q.12.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume Sutible data if necessary.***

Q1) a) Explain 4+1 architecture views. **[6]**

b) Draw Use case diagram for online hotel booking system. **[6]**

OR

Q2) a) Explain unified process. **[6]**

b) Draw Use case diagram for ATM system. **[6]**

Q3) a) Explain Generalization with example in class diagram. **[6]**

b) Draw Class diagram for library management system. **[6]**

OR

Q4) a) What is association? Explain different types of association. **[6]**

b) Draw class diagram for online flight booking system. **[6]**

Q5) a) Explain Component diagram with example. **[6]**

b) Write note on Package diagram. **[5]**

OR

Q6) a) Explain deployment diagram with example. **[6]**

b) Write note on 'Applications of UML in embedded systems'. **[5]**

P.T.O.

Q7) a) What are the essential elements of an interaction diagram? **[6]**

b) What is the purpose of timing diagram? **[6]**

OR

Q8) a) Distinguish between state machine diagram and activity diagram. **[6]**

b) Why is it important to have knowledge on timing diagram when programming? **[6]**

Q9) a) What are the 5 stages of architectural design process? **[6]**

b) Write a short note on Service oriented Architecture. **[6]**

OR

Q10)a) Difference between Object oriented software architecture and Client server Architecture. **[6]**

b) What are the 5 principles of architecture? **[6]**

Q11)a) Explain the singleton design pattern with example? **[6]**

b) What is the main purpose of the Adapter design pattern? **[5]**

OR

Q12)a) Describe the 4 main types of patterns used in design? **[6]**

b) Write a short note on Behavioral design pattern. **[5]**

Total No. of Questions : 12]

SEAT No. :

P8680

[Total No. of Pages : 2

[6183]-562
S.Y. M.C.A. (Engineering)
INTERNET OF THINGS
(2020 Pattern) (Semester - III) (Elective - II) (410904D)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4,Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or .Q12.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume Sutible data if necessary.***

Q1) a) What is an embedded system explain the different applications of embedded system? **[6]**

b) Explain physical and logical design of IoT. **[6]**

OR

Q2) a) How does IoT system works? What are its functional blocks? **[6]**

b) Define communication protocols in IoT? **[6]**

Q3) a) What is the difference between M2M and IoT explain with examples? **[6]**

b) What is information driven global value chain? **[6]**

OR

Q4) a) Describe M2M to IoT architecture. **[6]**

b) What is M2M value chian? **[6]**

Q5) a) What are different layers of IoT reference model? **[6]**

b) What is deployment and operational view of reference architecture? **[5]**

OR

Q6) a) What does functional view of IoT reference architecture describe? **[6]**

b) What is difference between IoT reference model and reference architecture? **[5]**

P.T.O.

Q7) a) Explain the Protocol Standardization for IoT? **[6]**

b) Explain the M2M and WSN Protocols? **[6]**

OR

Q8) a) Explain the SCADA and RFID Protocols? **[6]**

b) Explain the Issues with IoT Standardization? **[6]**

Q9) a) Explain the Privacy and Security Issues? **[6]**

b) Explain the IoT Security. **[6]**

OR

Q10)a) Explain the Data Aggregation for the IoT in Smart Cities? **[6]**

b) Explain the Data Platforms for Smart Cities. **[6]**

Q11)a) Explain the Industry applications of IoT. **[6]**

b) Explain the Home Automation of IoT. **[5]**

OR

Q12)a) Explain the Survillance applications of IoT. **[6]**

b) Commit “Future Factory Concepts of IoT in Industry”. **[5]**