N.B. :(1) **All** questions are **compulsory**.

    (2) **Figures** to the **right** indicate **full** marks to the subquestion.

    (3) From question **2** to **7**, subquestion **(a)** is **compulsory** and attempt any **one** from **(b)** & **(c)**.

1. Attempt any **one** of the following :–

    (a) Define following with examples :–   10

        (i) Complete graph   (ii) Tree   (iii) Group

        (iv) Regular graph   (v) Normal subgroup.

    (b) State and prove demorgan's law of Sets.   10

2. (a) In a room containing 28 people, there are 18 people who speak English, 15 people who 8 speak Hindi and 22 people who speak Kannada, 9 persons speak both English and Hindi, 11 persons speak both Hindi and Kannada whereas 13 persons speak both Kannada and English.

      (i) How many speak all three languages ?

      (ii) How many speak exactly one of the three languages ?

    (b) Check whether following are Tautology or not –   7

      (i) $(p \rightarrow q) \leftrightarrow (\sim p \vee q)$
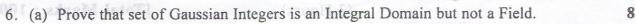
      (ii) $\sim P \rightarrow Q$

    (c) Prove for any three sets P, Q & R, $P\Delta(Q \cap R) \equiv (P \Delta Q) \cap (P \Delta R)$.   7

3. (a) Prove that if R is any Equivalence relation on set S then R induces partition of S.   8

    (b) Relation R on the set A = {1, 2, 3, 4} is defined by xRy iff x + y is Odd. Find the 7 Transitive closure of R.

    (c) If A = {1, 2, 3} and B = {p, q}. Find A x B, B x A and check whether A x B = B x A 7 or not.

4. (a) Prove that an injective mapping from finite set to itself is Bijective.   8

    (b) Show that if there are 100 students in a class then there are at least four students whose 7 first name begins with the same alphabet.

    (c) Show that the mapping f(x) = 3x + 7 from Real numbers to itself is Bijective and find 7 its inverse.

5. (a) State and prove Handshaking Lemma for graphs.   8

    (b) Define Subgraph and draw all possible Subgraphs of K_3.   7

    (c) Define Planar graph and check whether the following graphs are Planar or Not –   7

      (i) $K_{3,3}$ (ii) K_4.

[TURN OVER

6. (a) Prove that set of Gaussian Integers is an Integral Domain but not a Field.   8

(b) Check whether set of Natural numbers with the Operation $a*b = a^2 + b^2$ forms a Group   7
   or not.

(c) What is the minimum number of students required in a class to be sure that at least six   7
   will receive the same grade if there are five possible grades ?

7. (a) Derive recurrence relation for Fibonacci sequence and hence solve the recurrence   8
   relation.

(b) Determine the coefficient of x^6 in generating function $(1 + 3x)^{-7}$.   7

(c) Solve the following recurrence relation with the given initial conditions.   7
   $a_n = a_{n-1} + 6a_{n-2}$ for $n \geq 2$, $a_0 = 3$, $a_1 = 6$.

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S.Y.BSc (I.T.) (Sem. III)

Computer Graphics

June 2017

YO-5185

(3 Hours)

[Total Marks : 100

N.B. : **All** questions are **compulsory**.

1. Attempt any **three** question from the following :—   5
   (a) List and explain various applications of computer graphics.   5
   (b) Explain the working and construction of CRT display.

2. Attempt any **three** :—
   (a) Derive the decision parameter for breshenam's line drawing algorithm.   5
   (b) Calculate the pixel positions along straight line between (5, 3) and (10, 10)   5
       using DDA algorithm.
   (c) Describe the differences between Raster Scan Display and Random Scan Display.   5
   (d) Explain the Midpoint circle algorithm.   5

3. Attempt any **three** :—
   (a) Write the 2-D transformation matrix for Translation and Rotation.   5
   (b) Write a short note on 2D reflection.   5
   (c) Define Scaling Write the homogeneous transformation matrix for Scaling.   5
   (d) Prove that successive 2D rotation are additive i.e. $R(\theta1) . R(\theta2) = R(\theta1 + \theta2)$.   5

4. Attempt any **three** :—
   (a) Explain the concept of world coordinates and Viewing coordinates.   5
   (b) Write a short note on 3D Scaling and Rotation.   5
   (c) How objects are represented in Homogeneous coordinate system ?   5
   (d) Write a short note on perspective projection.   5

5. Attempt any **three** :—
   (a) Describe the method of flood fill algorithm.   5
   (b) Write a short note on line clipping and polygon clipping ?   5
   (c) Develop a function/procedure which performs line clipping using Cohen Sutherland.   5
       Method, how line between (2,2) and (12,9) is clipped against window with
       (Wxmin, Wymin) = (4, 4) and (Wxmax, Wymax) = (9, 8)
   (d) Write a short note on inside/outside test. Explain a situation when inside/outside   5
       test fails.

6. Attempt any **three** :—
   (a) Write a short note on Fractal curves.   5
   (b) Explain coherence and different types of coherent.   5
   (c) What are different types of surface representation ?   5
   (d) Explain the algorithm for drawing Bezier curve.   5

7. Attempt any **three** :—
   (a) Explain the concept of morphing techniques.   5
   (b) List and explain the different types of shadows.   5
   (c) Write a short note on computer animation.   5
   (d) Describe the concept of ray tracing.   5

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(3 Hours)   [Total Marks : 100

N.B. :(1) **All** Questions are **compulsory**.
   (2) **Figures** to **right** indicate **full** marks.

1. Attempt the following :–
   a. Write a short note on SET operator.   5
   b. Write a short note Data Manipulation Language.   5

2. Attempt any **3** from the following :–
   a. What are constraints ? Explain its types.   5
   b. What is view ? State and explain the benefits of views.   5
   c. What are types of joins ? Explain the outer join in detail.   5
   d. Enlist and explain aggregate functions with suitable example.   5

3. Attempt any **3** from the following :–
   a. State the difference between correlated and non-correlated subquery.   5
   b. Explain the following functions – FLOOR, NVL, SUBSTR.   5
   c. What is privilege ? Explain Grant and Revoke commands with example.   5
   d. Explain Having clause. What's the difference between the HAVING clause and the   5
      WHERE.

4. Attempt any **3** from the following :–
   a. What is PL/SQL ? Explain the program structure of PL/SQL.   5
   b. Write a PL/SQL block to display the addition of two numbers.   5
   c. Write a short note on % type attribute.   5
   d. What is transaction ? Explain COMMIT, ROLLBACK and SAVEPOINT in the   5
      transaction.

5. Attempt any **3** from the following :–
   a. What are different types of loop ? Explain ant two types loop suitable example.   5
   b. What is Explicit cursor ? Enlist the attributes of explicit cursor.   5
   c. Enlist and explain any five methods of Index by table.   5
   d. What is exception ? How exception is handled in PL/SQL?   5

6. Attempt any **3** from the following :–
   a. Code a function named fn_check_account_id that accepts one parameter that tests   5
      the existence of an account number (account_id) in the table tbl_bank_account. This
      function should return a value of 1 if the account exists or zero if it doesn't.
   b. What is package ? State and explain the components of package.   5
   c. Write a short note on overloading of subprogram.   5
   d. What is a stored procedure ? Give syntax & explain the advantages of procedures.   5

7. Attempt any **3** from the following :–
   a. What is a trigger ? Explain its components.   5
   b. What is Dynamic SQL ? Explain the execution flow of Dynamic SQL.   5
   c. Explain any five functions/procedures of DBMS_OUTPUT.   5
   d. Explain INSTEAD OF trigger? Differentiate between triggers & procedures ?   5

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4

(3 Hours) [Total Marks : 100

N.B. :(1) Question No. 1 is **compulsory**.
  (2) **Every** question has an option.
  (3) **All** questions carry **equal** marks.

1. Design the class Demo which will contain the following methods :   10
readNo () will be private method, factorial () for calculating the factorial of a number, reverseNO () will reverse the given number and is Palindrome () will check the given number is palindrome.

2. Write any 3 from the following :—
  (a) What are the advantages of oop ?   5
  (b) Differentiate between procedural & object oriented approach.   5
  (c) Define the terms Data Hiding and polymorphism.   5
  (d) What is object and class ? Explain with example.   5

3. Write any 3 from the following :—
  (a) How do we declare a member of a class static ?   5
  (b) Explain what is a copy constructor with suitable program.   5
  (c) How you declare a pointer to an object ? Explain.   5
  (d) Describe the importance of destructors.   5

4. Write any 3 from the following :—
  (a) What is operator overloading ? Write any 4 rules to overload operator.   5
  (b) Explain what is friend class & friend function.   5
  (c) What is conversion function ? How it is created ?   5
  (d) Define a class String. Use overload = = operator to compare two strings.   5

5. Write any 3 from the following :—
  (a) Explain the different types of File mode.   5
  (b) What is pure virtual member function ? Explain.   5
  (c) Explain the different forms of inheritance.   5
  (d) Write a diffference between static and dynamic binding ?   5

6. Write any 3 from the following :—
  (a) List the Assignment and Append operators of string.   5
  (b) Write a use of put (), write (), getline () & read () function.   5
  (c) How are exceptions handled in classes ?   5
  (d) Define ther terms :- Input stream & Output stream.   5

7. Write any 3 from the following :—
  (a) What is Class template ? Explain with examples.   5
  (b) Write a difference between function overloading & Function Template.   5
  (c) How is an iterator like an array subscript ?   5
  (d) Explain the terms vector and stack.   5

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(5)

Con. 381–17. **Modern Operating System**

YO–5535

(3 Hours)

[Total Marks : 100]

N.B. : All questions are compulsory, unless specified.

1. Attempt **any 2** from the following :— 10
   (a) Write a note on clustered systems.
   (b) Explain Handheld systems.
   (c) Write a note on generations of Operating Systems.
   (d) Explain tree-structured directory.

2. Attempt **any 3** from the following :— 15
   (a) Define and explain the following terms :
       (a) Linker (b) Compiler
   (b) What is NFS ?
   (c) Explain batch processing and time sharing systems.
   (d) Explain multiprocessing system and its advantages.

3. Attempt **any 3** from the following :— 15
   (a) Explain PCB with its components.
   (b) Explain system boot.
   (c) Write a note on Layered Structure.
   (d) Explain in brief, virtual machines.

4. Attempt **any 3** from the following :— 15
   (a) Define and explain process with different process states.
   (b) How does a client communicate with a Server ?
   (c) Explain different benefits of threads.
   (d) Define and explain semaphores.

5. Attempt **any 3** from the following :— 15
   (a) Write a note on different scheduling algorithms.
   (b) What is dynamic partition ?
   (c) Explain multithreading models.
   (d) Explain different operating system services.

6. Attempt **any 3** from the following :— 15
   (a) Write a note on Demand Paging.
   (b) Which four conditions are necessary for Deadlock ?
   (c) Explain thrashing.
   (d) Explain Resource Allocation Graph.

7. Attempt **any 3** from the following :— 15
   (a) Write a note on Deadlock Prevention.
   (b) What are different types of Security Problems ?
   (c) Explain RAID.
   (d) What are different File Access Methods ?