Computer Science 2nd yr.

ANSWER ANY FIVE QUESTIONS. 5X6=30 Date : 21.11.2019.

1. Show by vector method
   $\text{Cos}(A+B) = \cos A \cos B - \sin A \sin B$
2. Find the directional derivative of $\varphi = x^2yz + 4xz^2$ at $(1,-2,-1)$ in the direction $2\hat{\imath} - \hat{\jmath} - 2\hat{k}$.
3. Show that the necessary and sufficient condition that u(x,y,z),v(x,y,z) and w(x,y,z) be functionally related through the equation is F(u,v,w)=0 is $[\vec{\nabla}u\ \vec{\nabla}v\ \vec{\nabla}w] = 0$.
4. Find the equations for the tangent plane and normal to the surface $\varphi(x,y,z) = xz^2 + x^2 - z + 1 = 0$ at the point (1,-3, 2).
5. Verify Stokes' theorem for the function $\bar{F} = x^2\hat{\imath} + xy\hat{\jmath}$ integrated round the squarein the plane z=0, whose sides are along the straight lines $x = 0, y = 0, x = a, and\ y = a$.
6. Find the mean and variance of the Binomial distribution with parameter (n,p).
7. Two urns contain respectively 2 red, 3 white and 3 red, 5 white balls. One ball is drawn at random from the first urn and transferred into the second. A ball is now drawn from the second urn and it turns out to be red. What is the probability that the transferred ball was white?

Sub: Computer Organisation, Class Test-1, Set 2 (any three) **(Time: 1hr, Marks: 30)**

1) Restoring type division (last two digits of your roll number) (example with algorithm) (CO3) (10)

2) (a) Implement Hardwired control unit using delay-element and sequence-counter methods. (b) Establish their relationship. (CO5) (6+4)

3) Write instructions to execute C=(A-A) + (A+A) using (a) 0-, (b) 1-, (c) 2- and (d) 3-address machines separately (CO2) (10).

4) (a) What are the attributes of computer organization and architecture? (b) What are the different steps in a process? (CO1) (c) Describe instruction cycle with all the steps. (CO2) (3+3+4).

BCSE 2nd year 1st Semester (2nd Class Test) |Set – 2|

Sub: **Computer Organisation**

Answer *any three*

Time: 45 Min. Full Marks: 30

1.	(a) Describe the design issues of set-associative mapping cache memory. (b) Identify the advantage and disadvantage of this procedure. (c) Discuss about two page replace algorithms.	4+2 +4
2.	(a) What are the three characteristics common to all RAID levels? (b) With pros and cons discuss about RAID levels 3, 4, 5 and 6.	2+8
3.	(a) Discuss about precise and imprecise exceptions in superscalar processor. (b) Illustrate the issues related to data hazard.	4+6
4.	(a) Write down the functions of different I/O modules. (b) Draw the block diagram of an I/O module.	7+3

Object Oriented Programming
1st test Full marks 30 Time: 1 hr.
Attempt All

CO1: Understand and utilize the concept of structure, pointer and functions in C

1) a) Consider, X is a 2-D array of integer. What is the difference between (x+i) and *(x+i)? Assume, i is an integer. 1.5

b) Assume p is char **. Using p, implement a 2D array to store 10 names of maximum length 15. 2

c) Consider the following code snippet and explain the output:

```
int *p1, x[5], (*p2)[5];
p1=x; p2=&x; printf("%d %d\n", p1, p2);
p1++; p2++; printf("%d %d\n", p1, p2);
```

2

d) In C++, compare a structure and class. 1.5

CO2: Develop programs for file processing in C

2) Assume a suitable file that stores roll, name and marks of the students. Write the code in C to modify the score for the roll number given by the user. 5

CO3: Understand and realize OOP features through C++

3) a) Comment on the size of an object of a class. 1

b) Compare a normal function, macro and inline function. 1.5

c) Comment on the utility of private member function. 1.5

d) Why may we need to write copy constructor of our own? 1.5

e) Consider there are two functions with prototype as **f(int, int)** and **f(char, char).** Explain what will be the outcome for the call **f(i, c)** where i is of type int and c is of type char. 1

f) Why do we need a friend function? 1.5

CO4: Design and implement the object oriented solution for problems using C++

4) a) An electric supply corporation maintains following information for every connection: consumer-id, consumer-name, consumer-address, meter-id, last reading and current reading. For every connection, a fixed meter rent (may vary time to time) is charged in every month. Per unit consumption rate is also fixed for all consumers and may vary time to time. In every moth, meter reading is to be updated. A bill is to be prepared (meter rent + charge for unit consumed) for the consumers in every month.
Design the class(es). 5

b) In an institute, each student has unique class roll number. During examination unique examination roll number is also assigned to each student. The mapping between class roll and exam roll number is maintained at the examination controller's office. Evaluator submits score sheet containing the examination roll number and score of all students. Design the classes for the system with the following scope: system can store score sheet, mapping, given the examination roll number one can find the class roll number, given a class roll number one can find the score. 5

Object Oriented Programming
1st test Full marks 30 Time: 1 hr.
Attempt All

CO3: Understand and realize OOP features through C++

1) a) Consider, SAMPLE is a class with necessary support for the following operations. z=x+y, z=x-y where x, y, z are SAMPLE instances.
What minimal action will you take in the class to support z=x+5, z=x-10? 1

b) Consider, class A has two member functions f1(void) [public] and f2(void) [protected]. B has been derived from A in public mode. In B, there is a function f1(int). Consider b is an instance of Class B. **Explain** which functions will be called for the following statements in main():

i) b.f1() ii) b.f2() 2

c) What will you do to achieve runtime polymorphism? 2

d) What is the utility of abstract class? 1.5

e) Why do we need virtual base class? 1.5

f) What is the use of exception handling? 1

g) Compare function overloading and function template. 1

CO4: Design and implement the object oriented solution for problems using C++

2) a) In a library of an institute each member has unique member-id, name, phone number and e-mail id. Member may be a student, faculty or other employee of the institute. For the students roll number, department and course are to be stored. For faculty and other employees employee id, department are to be stored. Maximum number of books to be issued, period of issue, late return charges vary for different category of members. A member may like to update and view his details, submit book issue and return requests. Keep it in mind that the requests will be processed by the system according to the policy which is not within your current scope. **Design** the classes (no code is required). 4

b) i) **Design and implement** a generic class in C++ that can store and work with an array of numeric elements. Size may be defined at the time of object creation. One should be able to find the largest value in the array. If X is an object then cout << X will print all the elements.
ii) Now, suppose I want to have of array of student objects using the generic class. Each student has roll and score. In this case, finding largest value means finding the object with highest score. What measures will you take so that the same generic class can be used? 4+3

CO5: Understand and utilize the concept of namespace and STL classes in C++

3) a) What is a namespace? What are using declaration and using directive? 4

b) Each student has roll, name and score. Store student data in a list, sort them in the descending order of score and display all students. Design and implement the classes. Use suitable STL class. 5