West Bengal University

West Bengal State University
B.A./B.Sc./B.Com. (Honours, Major, General) Examinations, 2011
Part – III

COMPUTER SCIENCE — HONOURS
Paper - VI

Duration : 4 Hours]   [Maximum Marks : 100

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Question No. **1** is compulsory and answer any *five* questions, taking at least *one* from each Group.

1.   Answer any *ten* questions in brief : $10 \times 2 = 20$

a)   How do you declare an array of N pointers to functions returning pointers to functions returning pointers to characters ?

b)   Anything wrong with this code ?

$T * p = $ new $T [10]$;

delete p ;

c)   What is virtual constructors / destructors ?

d)   Can you write a code which compiles in C but not in C ++ ?

e)   Which parameter(s) is/are used in COCOMO estimation model ?

f)   What is software reverse engineering ?

g)   Define stamp coupling.

h)   Define polymorphism.

i)   What is a template class ? Why is it used ?

j)   What are the components of a DFD ?

k)   Distinguish between logical and physical DFD's.

l)   What is functional testing ?

m) State and explain two application areas of computer graphics.

n) Suppose that you increase the resolution of your monitor from 100 dpi to 200 dpi. What will be the size of a 1 inch × 1 inch picture ?

[dpi is dots per inch].

Answer any *five* questions, taking at least *one* from each Group.

GROUP – A

2. a) What are empty classes ? Can instances of empty class be created ? Give reasons.

b) What is data hiding ? What are the different mechanisms for protecting data from the external users ?

c) What are the differences between default and parameterized constructors ? What are read-only objects ? What is the role of constructor in creating such objects ?

d) Distinguish between the following two statements :

String name ("Ram") ;

String name = "Ram" ; $(2 + 1) + (2 + 2) + (2 + 1 + 2 + 2) + 2$

3. a) What is operator overloading and how is it done ? Illustrate.

b) Why cannot the operator ? : be overloaded in C++ ?

c) What is inheritance ? Explain simple and multiple inheritances with suitable examples.

d) Explain the role of virtual base class in inheritance ambiguity. $4 + 3 + 4 + 5$

GROUP – B

4. a) What do you mean by cohesion and coupling in the context of software design ? How are those concepts useful arriving at a good design of a system ?

b) What are the symptoms of the present software crisis ? What factors have contributed to the making of the present software crisis ? What are the possible solutions to the present software crisis ?

c) Differentiate between black-box testing and white-box testing with suitable example.

$6 + 6 + 4$

5. a) What is regression testing ? Why is regression testing necessary ? How is regression testing performed ?

b) What is meant by structural complexity of a program ? Define metric for measuring structural complexity of a program. How is this different from the computational complexity of a program ?

c) What is meant by a code walk-through ?   (2 + 2 + 3) + (2 + 3 + 2) + 2

GROUP – C

6. a) Use pseudo-code to describe the DDA algorithm for scan converting a line whose slope is between 45° and – 45° i.e. $| m | > 1$.

b) What are the steps required to scan-convert a polygonal area using the scan line algorithm ?

c) Derive the transformation that rotates an object point θ° about the origin. Write the matrix representation for this rotation.

5 + 5 + 6

7. a) Compare between coordinate transformation and geometric transformation.

b) Derive the equations for translation, rotation and scaling in respect of 2D coordinate transformation.

c) Prove that 2D rotation and scaling commute if $S_x = S_y$ or $θ = nπ$, where n is an integer, S_x and S_y are scale factors along x-axis and y-axis respectively and $θ$ is the angle of rotation.

d) Consider a circle with centre (0, 0) and radius 4. Suppose the circle is transformed in such a way that its circumference has become half in length and its centre has been shifted to (2, 3). Find out the underlying transformations.

2 + 6 + 4 + 4

GROUP – D

8. a) What does the term 'redundancy' mean ? Discuss the implications of redundancy in a relational database.

b) Define primary key and foreign key.

c) Let relation $R(A, B, C, D, E)$ has functional dependencies :

$$AB \rightarrow C ; \quad D \rightarrow A ; \quad AE \rightarrow B ; \quad CD \rightarrow E ; \quad BE \rightarrow D$$

Find all the candidate keys of R.

d) What is a distributed database management system ? How is it different from client server database system ?

$4 + (2 \times 1\frac{1}{2}) + 5 + 4$

9. a) What do you understand by lossless join ? Explain with suitable example.

b) What is triple calculus ? Define triple variables and well-formed formulas.

c) Explain the SQL construction for selection, projection and join.

d) Consider the relation $R = \{A, B, C, D, E, F, G, H, I, J\}$ and set of functional dependencies :

$$F = \{\{A, B\} \rightarrow \{C\}, [A] \rightarrow \{D, E\} ; \{B\} \rightarrow [F] ; [F] \rightarrow [G, H] ; [D] \rightarrow [I, J]\}$$

Decompose R into 2 NF relations.

$3 + 3 + 3 + 7$