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S. Y. B.TECH. (COMPUTER ENGINEERING) (SEMESTER – III)

COURSE NAME: PROGRAMMING FOR PROBLEM SOLVING

COURSE CODE: CSUA21183

SOLUTION (PATTERN 2018)

Time: [1 Hour] **[Max. Marks: 20]**

Instructions to candidates:

1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Use of scientific calculator is allowed.**
4) **Assume suitable data where ever required.**

Q1) Attempt any **one**

a) Explain in brief, the role of 4 Organizational Charts (other than PAC, IPO, Structure) in problem solving. [08]

Draw PAC, Interactivity and IPO Charts for the following problem.

Joe Traders has a set policy for accepting a company as their client. To become their client, a company should satisfy at least 1 of the criteria mentioned below. Set up a single logical expression for checking eligibility of a company to become client of Joe Traders.

Criteria1 - If companies' yearly turnover is above 30 Crores

Criteria2 - If company has "Gold" rating from Chamber of Commerce

Criteria3 - If yearly turnover is less than 30 Crore, then, its first order is at least for 200 dozen items

Role of Organizational charts (any 4) [02]

Organizational Charts are tools for finding a solution to the given problem on computer. The PAC shows a beginning analysis of the problem. **The structure chart** or **interactivity chart,** shows the overall layout or structure of the solution. The **IPO chart,** shows the input, the processing, and the output. The **algorithms,** show the sequence of instructions comprising the solution. The **flowcharts,** which are graphic representations of the algorithms and **pseudocode,** represents a language like solution.

A **coupling diagram** and **Data Dictionary** shows the relationship between the modules and the data needed for the modules. The Data Dictionary lists all date variable names and their definitions. **UML (Unified Modeling Language)** is a basic tool when using Object Oriented Programming structure.

Draw PAC [02] –

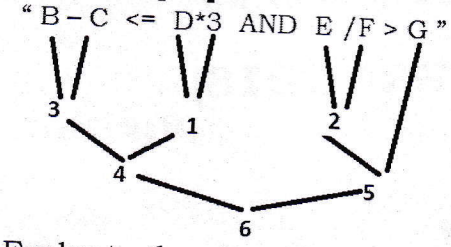
Given Data CompTurnover GoldRating First_order	Required Results EligibleClient
Processing Required EligibleClient = (CompTurnover>30) OR GoldRating OR (First_Order >=2400)	Solution Alternatives 1. Take rating from user 2. * Take Gold rating-boolean from user

Draw Interactivity [02] - Control Module, Read Module, Process Module, Print Module

Draw IPO[02] – Input, Processing, Module Reference, Output

b) Solve the following using appropriate variable names, operator hierarchy and diagrams where applicable. [08]
Explain with diagram how the expression " B – C <= D*3 AND E /F > G " is evaluated.

Diagram [02]



Evaluate the above for B=11, C=5, D=2, E=10, F=5, G=2.

Evaluation [01] False

Write an equation for finding what percentage is monthly house rent of monthly allowance of a student.

Equation[01] HsRentPercent=HsRent*100/Allowance

Correct the R.H.S. of the equation: 7 MOD 21 = 0

Correct Equation[01] 7 MOD 21 = 7

Write a short note on UML Diagrams.

Use case, Class, Sequence, State chart and Activity Diagram [03]

Use Case - Use **case diagrams** describe how a system functions from the user's standpoint. They present who may use what part of the system. There are basically two parts of a use case diagram: the actor and the use case. The actor represents the users of the system, including human and nonhuman entities. The use case describes the services required by the actor.

Class - Class diagrams graphically describe how a class functions. Basically, they describe the data structure of the solution. They describe the class, their attributes, and their operations.

Sequence - Sequencing diagrams graphically present the interactivity between objects. The interactions are represented as messages in the diagram. The diagram shows the actions by the user and the subsequent actions that result between objects.

Statechart - A **statechart diagram** describes what happens to a given value of an object as it proceeds through the system. An event is an activity that sends a message that causes something to happen. The action is the set of tasks or instructions that is the response to the event.

Activity - An **activity diagram** describes the flow of activities. This type of diagram is similar to a data flow chart. It specifies what happens and when. The major difference is in the symbols used. Because, general activities and not specific instructions are represented, all activities use a flattened ellipse

Q 2) Attempt any **one**

a) List the common types of modules for solving a problem? Name the logic structures used when designing a module. How are the opposing concepts of cohesion and coupling related to designing modules? [08]

List of Common Modules [01] Control Module, Initialization, Process Modules (Read and Data Validation, Calculate and Print), Wrapup Modules

Name of logic structures [01] Sequencial, Decision and Loop logic structures

Cohesion and Coupling [02] Ideally, a module should be independent. Cohesion is the ability for a module to work

independently from all other modules. Each module should have a function such as data entry, printing information, specific calculations, and so forth. To work independently, each module should have a single entry and single exit. It is not realistic, though. Modules need to share data from other modules in order to complete the modular tasks. This sharing of data is called coupling. Coupling is accomplished by some type of interface between modules that enables data to be passed from one module to another with the minimum interruption of the modular independence. Coupling allows for the communication between modules.

Draw the flowchart, with correct symbols, for a solution to tell the user whether a string is a palindrome. (A palindrome string spells the same in both forward or backward direction, e.g. racecar, level, madam, etc. [04]

Flowchart [04]

b) While arranging logistics for a training workshop, Harry wants to buy "folders" to distribute to participants. Total number of folders required is equal to the number of participants, plus an additional 5 folders. [08]

The rate for 1 folder when bought as a single unit is Rs 40. The rate for 1 folder when bought in bulk (wholesale) is less.

The wholesale rate of 1 folder when bought in multiples of 100 is Rs 35.

The wholesale rate of 1 folder when bought in multiples of 500 is Rs 32.

Draw a PAC for the problem of buying best package, for least amount of money, for the given number of participants. Also write an algorithm, flowchart and pseudo code, using correct symbols.

PAC[02],

Given Data	Required Results
Processing Required	Solution Alternatives

Algorithm [02],

Flowchart[02],

Pseudo code [02]

Q3) Attempt any **one**

a) Write a 'C' program snippet to print the pattern below: [04]
N is an even number, accepted from user.

1 2^1 2^2 2^3 2^4..... 2^{N-2} 2^{N-1} 2^N 2^1 2^2 2^3 2^4.....2^{N-2} 2^{N-1} 2^2 2^3 2^4.....2^{N-2} ..... $2^{N/2}$	E.g. If N=6, pattern is: 1 2 4 8 16 32 64 2 4 8 16 32 4 8 16 8
'C' program snippet [04]	

b) This is example of Polymorphism concept of OOP. [01]
3 Blanks [03] [04]

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