



COLLEGE OF BUSINESS, PEACE, LEADERSHIP AND GOVERNANCE

NCSC100: PROBLEM SOLVING AND PROGRAMMING CONCEPTS

END OF FIRST SEMESTER EXAMINATIONS

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TIME: 5 HOURS

INSTRUCTIONS

1. Answer one question
 2. Submit your answers in single PDF format document.
 3. Use Microsoft VISIO or Draw IO to develop your solution diagrams.
 4. Compile your answer into one single PDF format
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QUESTION 1 [100]

- (a) A student goes to Africa University everyday by car and passes through town.
- (i) Draw a flow chart diagram to illustrate the movement of the student including all possible circumstances they may meet along the way. [20]

(ii) Write the pseudo code

(iii) Write the algorithm for the above the movement. [20]

- (b) Write an algorithm that performs the following: [20]

(ii) Ask a user to enter a number. If the number is between 5 and 14, write the word GREEN. If the number is between 15 and 25, write the word BLUE. If the number is between 26 and 35, write the word ORANGE. If it is any other number, write that ALL COLOURS ARE BEAUTIFUL.

(i) Draw the program flow chart for the above. [20]

- (c) Write an algorithm to display the total water bill charges of the month depending upon the number of units consumed by the customer as per the following criteria:

- For the first 100 units @ \$5 per unit
- for next 150 units @ \$10 per unit
- More than 250 units @ 20 per unit

Also add meter charges of \$75 per month to calculate the total water bill .

(ii) Draw the flow chart diagram.

- (e) Following is an algorithm for going to school or college. Suggest improvements in this to include other options?

Reach_School_Algorithm

- Wake up
- Get ready
- Take lunch box
- Take bus
- Get off the bus
- Reach school or college

QUESTION 2

A solution to a problem is developed in seven steps:

- 1.** Analyze the problem.
- 2.** Develop the structure chart.
- 3.** Develop the IPO chart.
- 4.** Develop the coupling diagram and the data dictionary.
- 5.** Develop the algorithms.
- 6.** Develop the flowcharts.
- 7.** Test the solution.

The heating system in a school should be switched on if the average temperature is less than 17 degrees Celsius (°C). The average temperature is found from the temperatures in the Art, English and Music Departments. You are required to write a program that allows the user to input the three temperatures. The program calculates and displays the average temperature then displays 'Heating should be on.' or 'Heating should be off.' as appropriate. [100]

QUESTION 3 [100]

Question 3-1

A school is planning some outdoor activities for its students. The staff wants to create a database of how parents can help. The secretary sets up the database table in Figure 1-7 to keep the information.

| last_name | first_name | phone | contribution | contribution2 |
|-----------|------------|---------|------------------|---------------|
| Smith | Jane | 4623598 | Food preparation | Driving |
| Green | Rob | 8965431 | Transport | |
| Henry | James | 9576342 | Camping Gear | Cooking |
| Wang | Li | 9612345 | Cooking | |

Figure 1-7. Initial database table for recording parent contributions

What problems can you foresee in making good use of this information?

Suggest some better ways that this information could be stored.

Question 3-2

A small library keeps a roster of who will be at the desk each day. They have a database table as shown in Figure 1-8.

| week_start | Mon | Tue | Wed | Thur | Fri |
|------------|------|-----|--------|--------|--------|
| 17/10/2011 | Jane | Sue | George | Sue | Jane |
| 24/10/2011 | Jane | Sue | Linda | Sue | Lee |
| 31/10/2011 | Sue | Sue | Lee | George | George |

Figure 1-8. An initial database table to record roster duties

What problems can you foresee in making good use of this information?

Suggest some better ways that this information could be stored.