BACHELOR OF ENGINEERING IN CHEMICAL ENGINEERING EXAMINATION, 2017
(FIRST YEAR SECOND SEMESTER)
INTRODUCTION TO COMPUTER PROGRAMMING

TIME: 3 HRS

FULL MARKS: 100

(Use Separate Answer Scripts for each part)

Part I

Use C or C++ to write the programs

Answer <u>Question no. 1</u> and any *two* from the rest

1. A) Draw a <u>flowchart</u> (with algorithm) to solve the following series neglecting the terms which are less than 10^{-4} in magnitude.

$$y = 1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \frac{x^6}{6!} + \cdots \infty$$

B) There are four subjects Mathematics, Physics, Organic Chemistry and Physical Chemistry in a semester. Each student can choose two subjects. There are some conditions which have to be used to choose the subjects. Draw a <u>flowchart</u> which can take the name of first subject as an input and print the names of second subject or subjects that can be chosen. The conditions are:

   i. If you choose Mathematics you can choose Physics.

   ii. If you choose Organic Chemistry you can choose Physical Chemistry.

   iii. If you choose Physical Chemistry you can choose Physics.

10+10

2. Write a <u>program</u> to find the value of y with the help of following relations.

$$y(x, n) = \begin{cases} 1 + x & when\ n = 1 \\ 1 + {x}/{n} & when\ n = 2 \\ 1 + x^n & when\ n = 3 \end{cases}$$

15

3. Develop a <u>program</u> to read a matrix of order $m \times n$ and print the sum of all elements using recursive function.

15

4. Write a <u>program</u> to print integers from 1 to n (input from user) omitting those which are divisible by 7 using <u>for</u> loop.

15

[Turn over

Use separate answer scripts for each part

Part II

Write programs in C/C++ language

Answer Question Number 1 and any TWO from the rest

1. i) <u>Draw a flow chart</u> to check a user supplied integer number is a prime number or not. [10]

   ii) <u>Draw a flow chart</u> to print first 20 numbers of the Fibonacci series. [10]

2. <u>Write the program</u> that takes a positive integer in the range 1 to 365 (which corresponds to the day of the year) as input and outputs the day of the week. Assume that day 1 is Sunday. Make use of the switch statement. **For example:** Input: 16 Output: Monday; Input: 26 Output: Thursday [15]

3. <u>Write the program</u> that takes the annual salary (in Lac INR) of a person as input and outputs the corresponding amount of income tax to be paid by the person (again in Lac INR). The income tax is computed according to the following protocol:

   - If salary is less than 2 Lacs, no tax is to be charged.
   - If it is more than 2 Lacs but less than 5 Lacs, charge 10% of tax on whatever is in excess of 2 Lacs.
   - If it is more than 5 Lacs but less than 10 Lacs, charge 20% on whatever is in excess of 5 Lacs in addition to the tax on 5 Lacs according to the previous rule.
   - If it is more than 10 Lacs, charge 30% on whatever is in excess of 10 Lacs in addition to the tax on 5 Lacs according to the previous rule. [15]

4. <u>Write a program</u> to compute $_nP_r$ and $_nC_r$ from the user input values of n and r. Calculation of factorial should be done in **user defined function**. [15]