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Ex/ET/T/116/2017(S)

B.E.T.C.E 1st Year 1st Semester Supplementary Examination - 2017

COMPUTER PROGRAMMING
AND NUMERICAL ANALYSIS

Time: 3 hours

Full Marks: 100

Answer any four questions from Group A and any one question from Group B

Group A

- Q.1 (a) Write a C program to print "ETCE" and "Jadavpur University" in two separate lines. 5
(b) Write a C program to first read your name, roll number, and CGPA. The same program should then display the above information in separate lines. Your program should have prompt statements like "Enter your name:". 9
(c) What are library functions? Name the library functions you have used for writing the programs in (a) and (b). 6
- Q.2 (a) What do you mean by control statements? Give examples. 5
(b) Differentiate between **if-else** and **switch** statements. 5
(c) Write a C program to check if a year is a leap year. Display appropriate messages. 10
- Q.3 (a) Discuss for loop in C. 5
(b) How a **while** loop is different from a **for** loop? 5
(c) Write a C program to print the sum of the digits of any inputted integer. 10
- Q.4 (a) Explain the importance of functions in C with examples. 5
(b) What is meant by parameter passing? Name two different ways in which parameters can be passed in C. 5
(c) Write a C program to calculate the sum of natural numbers using recursion. For example, if a user inputs 3, your program should output $1+2+3 = 6$. Use a separate function to realize the recursive sum. 10
- Q.5 (a) Define an *array* in C with suitable examples. 5
(b) Write a C program to find the sum of the maximum and the minimum elements of a 1-D *array* with 10 integers. 10
(c) How can you modify your program if the number of elements in the *array* is known only during execution? 5
- Q.6 (a) Discuss *structure* in C with proper examples. 5
(b) Create a *structure* in C to model a date calendar with appropriate members. Show how you can assign values to the above members using a C program. 10
(c) State and explain the syntax of **fread** and **fwrite** functions in C. 5

Group B

- Q.7 (a) Explain the *Successive* Bisection method for finding a root of an equation. 7
 (b) Clearly argue whether the method in (a) is guaranteed to converge. 3
 (c) Use the method in (a) to solve: $f(x) = x^2 - 25 = 0$ with the initial guesses as $x_0 = 2$ and $x_1 = 7$. The allowed convergence error is 0.0001. 10

- Q. 8 (a) Discuss the importance of numerical integration. 3
 (b) Explain the *trapezoidal rule* of numerical integration. 7
 (c) The following points were found empirically.

x	2.1	2.4	2.7	3.0	3.3	3.6
y	3.2	2.7	2.9	3.5	4.1	5.2

- Use the method in (b) to estimate $\int_{2.1}^{3.6} y \, dx$. 10