SET - I

B.E. / B.Tech. DEGREE PRACTICAL EXAMINATION, DECEMBER 2017

GE8161: PROBLEM SOLVING AND PYTHON PROGRAMMING LAB

Time: Three Hours **Maximum: 100 Marks**

1. a. Code a Python program to perform computation of sin (x) as given below: (50)

$$\sin x = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \frac{x^9}{9!} \cdots\cdots\cdots\cdots\cdots N\ terms$$

b. Code a Python program to accept a matrix, find the transpose of the matrix and print the result. (50)

2. a. Code a Python program to print the first 'N' prime numbers. (40)

b. Code a Python program to accept two matrices, multiply the two matrices and print the result. (60)

3. a. Code a Python program to sort 'n' numbers using insertion sort. (50)

b. Code a Python program to accept two matrices, add the two matrices and print the result. (50)

4. a. Code a Python program to sort 'n' numbers using selection sort. (50)

b. Code a Python program to accept two matrices, subtract the two matrices and print the result. (50)

5. a. Code a Python program to sort ‘n’ numbers using merge sort. (50)

b. Code a Python program to perform linear search. (50)

6. a. Code a Python program to that will accept roll number, name and total mark obtained by a student and assign grades according to the following conditions, and display the roll number, name, total mark and grade: (40)

Total Mark	**Grade**
>=90	A
>=80 and <90	B
>=70 and <80	C
>=60 and < 70	D
>=50 and <60	E
<50	Fail

b. Code a Python program to perform binary search. (60)

7. a. Code a Python program that will accepts a one character grade code of an employee and depending upon what grade code is input, display the basic pay of the employee according to the table given below: (40)

Grade Code	**Basic Pay (Rs.)**
A	15000
B	12000
C	10000
D	8000

b. Code a Python program to perform binary search. (60)

8. a. Code a Python program to check whether a given number is an Armstrong number or not. (50)

Note: A number N is an Armstrong number of order n (n being the number of digits if:

$$abcd\cdots = a^n + b^n + c^n + d^n + \cdots \cdots = N.$$

Example: The number 153 is an Armstrong number of order 3:

$$1^3 + 3^3 + 5^3 = 153$$

b. Code a Python program that reads in a line of text on a character-by-character basis, and then displays the characters in reverse order. Your program must use recursion to carry out the reversal of the characters. (50)

9. a. Code a Python program to compute the GCD of two numbers. (50)

b. Code a Python program to find the maximum of a list of numbers. (50)

10. a. Code a Python program to find the square root of a number using Newton's method. (50)

b. Code a Python program to sort 'n' numbers using selection sort. (50)

11. a. Code a Python program to perform computation of cos (x) as given below: (60)

$$\cos x = x - \frac{x^2}{2!} + \frac{x^4}{4!} - \frac{x^6}{6!} + \frac{x^8}{8!} \cdots\cdots\cdots\cdots\cdots \; N\ terms$$

b. Code a Python program to sort 'n' numbers using insertion sort. (40)

12. a. Code a Python program that reads a positive integer and then prints out all the positive divisors of that integer. (50)

Example: The positive divisors of positive integer 36 are 36, 18, 12, 9, 6, 4, 3, 2 and 1

b. Code a Python program to perform linear search. (50)

13. a. Code a Python program that reads a character and prints out whether or not it is a vowel or a consonant. (40)

b. Code a Python program to perform binary search. (60)

14. a. The factorial of a positive integer is defined as:

$$n! = 1 * 2 * 3 \cdots\cdots\cdots * (n-1) * n, where\ 0! = 1$$

Code a Python program to accept a positive integer, calculate the factorial using recursion and display the result. (40)

b. Code a Python program to perform merge sort. (60)

15. a. Code a Python program to generate first 'N' Fibonacci numbers. (50)

Note: The Fibonacci numbers are $0, 1, 1, 2, 3, 5, 8, 13, 21, 34, \cdots\cdots\cdots$ N where each number is the sum of the preceding two.

b. Code a Python program to perform linear search. (50)

16. a. An electricity board charges the following rates to domestic users:

For the first 100 units – 1.00 rupees per unit
For the next 200 units – 2.00 rupees per unit
Beyond 300 units – 3.00 rupees per unit

All users are charged a minimum of rupees 50.00/-. If the total amount is more than rupees 1,000/- then an additional surcharge of 15% is added.

Code a Python program to read the user id, name and number of units consumed by a set of users and prints the user id, name and charges. (50)

b. Code a Python program to sort 'n' numbers using selection sort. (50)

17. a. Code a Python program to print the first 'n' numbers divisible by 7. (40)

b. Code a Python program to perform binary search. (60)

18. a. Code a Python program to compute the sum of the series: (40)

$$1 + X + X^2 + X^3 + \cdots \cdots \cdots + X^n$$

b. Code a Python program to perform merge sort. (60)

19. a. Code a Python program to accept three distinct numbers, find the greatest and print the result. (40)

b. Code a Python program to accept two matrices, multiply the two matrices and print the result. (60)

20. a. Code a Python program to accept two numbers, find the quotient and remainder and print the result. (40)

b. Code a Python program to accept 'n' names, sort names in alphabetic order and print the result. (60)

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