Time: 1 hour   **Full marks:30**

Answer Question 1 and any four from Question 2 to 9

1. **ANSWER ANY FOUR** $1.5 \times 4 = 6$
   a. Define recurrence relation.
   b. If $f(x) = 4\cos x - 6x$, find the relative percentage error in f(x) for x=0,if error in x-0.005
   c. Consider a function f(x). Define $\Omega(f(x))$
   d. Define degree of a vertex and the pendant vertex of a given graph
   e. Define Hamiltonian path and circuit.
   f. What is Power set?
   g. Define Function. Give example.
   h. What do you mean by truncation and inherent error?

2. Solve the recurrence relation $a_{n+2} - 6a_{n+1} + 9a_n = 0$, $n \geq 0$, given that $a_0 = 1$ and $a_1 = 4$ 6

3. State the generalized principle of Inclusion and Exclusion. Show that $3^n > 2n$, for all n=1,2,3,….
   (2+4)

4. State and prove Generalized principle of Pigeon-hole Principle. Find the count of prime values within [1,100] using Principle of Inclusion and Exclusion.   3+3

5. Compute the positive root of $x^3 - x - 0.1 = 0$ by Newton Raphson method correct to six significant figures.   6

6. Give the geometrical interpretation of the secant method to find the root of a equation f(x)=0.   6

7. Write the composite expression of Simpson's 1/3 rd rule rule. Evaluate $\int_0^1 (4x-3x^2)dx$, taking 10 intervals using this rule.   6

8. What is the generating function for the sequence 1,1,1,1,1,1? Find the minimum number of students to be present in a class such that at least nine students are there who are born in the same month.   3+3

9. Use Regula Falsi method to find the real root of $x^3 - 4x - 9 = 0$ 6