ST. ANN’S COLLEGE OF ENGINEERING &TECHNOLOGY: CHIRALA
DEPARTMENT OF COMPUTERSCIENCE & ENGINEERING
MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE
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ASSIGNMENT QUESTIONS

UNIT-1

1. Establish the validity of the following argument “All integers are rational numbers. Some integers are powers of 2. Therefore, some rational numbers are powers of 2”.
2. Using the indirect method of proof show that p ® q, q® r, ¬ (p L r),(pÚ r) leads to conclusion’ r’.
3. Show that ((P V Q)Λ7(7PΛ (7Q V 7R))) V (7P Λ7Q) V (7PΛ 7R) is a tautology.
4. Explain pdnf, pcnf with suitable examples
5. Show that from (a) (∃x) (F(x)Λ S(x)) -> (y) (M(y) -> W (y)) (b)(∃y) (M(y) Λ 7W(y)) The conclusion (x) (F(x) -> 7S(x)) follows
6. Write all implications and equivalences of statement calculus.
7. Explain pdnf ? find pdnf of P ->((P->Q) Λ 7(7Q V 7P))
8. Verify the validity of the following argument “every living thing is a planet or an animal. Joe’s gold fish is alive and it is not a planet. All animals have hearts. Therefore Joe’s gold fish has a heart.
9. Show that the following statement is a tautology: (~PΛ (P->Q))->(~Q)
10. Using automatic theorem proving, show that:(P V Q) Λ (Q->R) Λ(P->M) = (RVM)
    a) Explain contra positive with example.
    b) Construct truth table for the compound predicate: p->(¬q Λ r).

UNIT-2

1. Explain representation of partially ordered set with suitable example?
2. Explain different types of functions with examples? Find inverse of 2x+3/4x-5.
3. In a distributive lattice, if aL b = aL c and aÚ b = aÚ c, prove that b = c.
4. Draw the Hasse’s diagrams representing the positive divisors of 36 and 120.By means of example show that A× B ¹ B ×A and (A ×B)× C ¹ A× (B ×C).
5. Let f: R®R and g: R®R, where R is the set of real numbers. Find fog and gof where f(x) = x2 – 2 and g(x) = x+4 .State where these functions are injective, surjective, bijective?
6. If A,B and C are any three sets then prove that (i) AÈ (B- A) = AÈ B(ii) A – (B È C) = (A- B) Ç (A- C)
7. Let X = { 1,2,3,4,5,6,7 } and R = { (x, y) / x – y is divisible by 3}. Show that R is an equivalence relation. Draw the graph of R.
8. Verify the following relation R on X = {1, 2, 3, 4} is an equivalence relation or not? Given R = {(1, 1), (1, 4), (4, 1), (2, 2), (2, 3), (3, 4), (3, 3), (3, 2), (4, 3),(4, 4)}.
9. Given below the relation matrix, MR of a relation R on the set {a,b,c} , find the relation matrices of R2 = RºR, R3=RºRºR. MR = 1 0 1
   1 1 0
   1 1 1
10. a) Draw the Hasse diagram for the power set (P(S), ≤), where S={1,2,3}.
    b)Explain partition and covering.

UNIT-3

1. Find the gcd of 42823 and 6409 using Euclidean algorithm.
2. State and prove lagrange’s theorem.
3. Explain ring, integral domain and field with suitable examples?
4. Explain Euclidian algorithm to find The Greatest Common Divisor of two numbers with suitable example?
5. (i)Prove that the inverse of the product of two elements of a group is the product of their inverses in reverse order? (ii) Prove that if “a” is any element of group G then (a-1)-1 = a.
6. Show that every cyclic group is abelian group, but the converse is not true.

7. Show that intersection of any two subgroups of a group G is also a sub group of G.
8. Explain different tests for primality.
9. Prove that G={-1,1,i,-i} is an Abelian group under multiplication.
10. a) Define compatibility of relation and give suitable example

    b) State Fermat's theorem.

UNIT-4

1. Find the number of integer solutions of $x1 + x2 + x3 + x4 + x5 = 30$ where $x1 \geq 2$, $x2 \geq 3$, $x3 \geq 4$, $x4 \geq 2$, $x5 \geq 0$.
2. Find the number of ways of giving 15 identical gift boxes to 6 persons A, B, C,D, E, F in such a way that the total number of boxes given to A nad B does not exceed 6.
3. Find the number of three digit even numbers with no repeated digits?
4. Find the least number of ways of choosing three different numbers from 1 to 10 so that all choices have the same sum?
5. In a sample of 200 logic chips, 46 have a defect D1, 52 have a defect D2, 60 have a defect D3, 14 have defects D1 and D2, 16 have defects D1 and D3, 20 have defects D2 and D3, and 3 have all the three defects. Find the number of chips having (i) at least one defect, (ii) no defect.
6. Prove the identity C(n+1, r) = C (n, r -1) + C (n, r)
7. A women has 20 close relatives and she wishes to invite 7 of them to dinner. In how many ways she can invite them in the following situations:

    (i) Two particular persons will not attend separately. (ii) Two particular persons will not attend together.
8. State and prove multinomial theorem? Determine the coefficient of $x^3y^3z^2$ in the expansion of $(2x – 3y + 5z)^8$
9. In how many ways can you select at least one king, if you choose five cards from a Deck of 52 cards?
10. a) How many ways are there to arrange the letters of the word ENGINNERING?

    b) Explain binomial theorem with example.

UNIT-5

1. Solve the recurrence relation an - 6 an-1 + 9 a n-2 =0 for n >= 2 Given that a0 =5, a1 =12.
2. Solve the recurrence relation an+3 = 3an+2 +4 a n+1 - 12an, for n >= 0, Given that a0 =0, a1 =-11, a2 =-15.
3. Find the generating functions of the following sequence

    (i) 0,1,-2,3,-4,…… (ii) 0,2,6,12,20,30,42,……..
4. Solve the recurrence relation 2 an - 3 an-1 =0 for n >= 1. Given that a4 =81.
5. Solve the recurrence relation an = 10an-1 +29 a n-2 for n >= 3 Given that a1 =10 , a2 =100.
6. Solve the recurrence relation 2 an+3 = an+2 +2 a n+1 - an, for n >= 0, Given that a0 =0, a1 =1 , a2 =2.
7. Solve the recurrence relation an + 7an-1 +8 a n-2 =0 for n >= 2, Given that a0 =2 , a1 =-7.
8. Solve the recurrence relation an + an-1 - 8 a n-2 - 12 an-3 =0 for n >= 3, Given that a0 =1, a1 =5 , a2 =1.
9. Verify by mathematical induction that an=A1n+A2 is a solution to an=d an/d + e where n=dk.
10. a) Solve the following recurrence relation using generating functions: an-6an-1=0 for n_1 and a0=1.

    b) Explain general solution and particular solution of recurrence relation?

UNIT-6

1. Show that in a connected planar graph G with n vertices and m edges has regions r = m-n+2 in every one of its diagram?
2. Explain isomorphism of two graphs with suitable example.
3. Define Eulerian circuit and Hamiltonian circuit, give an example of graph that has neither an Eulerian circuit nor Hamiltonian circuit.
4. Explain kruskal's algorithm to find minimal spanning tree of the graph with suitable example?
5. Define spanning tree of a graph, and explain DFS algorithm to find spanning tree of a graph with suitable example?
6. Explain union, intersection and symmetric difference of the graphs with suitable example?
7. Show that the complete graph K5 and complete bipartite graph K3,3 are not planar?
8. Prove that a connected graph is a tree if and only if it is minimally connected.
9. What is a cut vertex, cut set and bridge? Explain with suitable examples.
10. Show that the maximum number of edges in a complete bipartiate graphs with n vertices is n2/4.