

Code : 1P2B15

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES :: RAJAMPET  
(AUTONOMOUS)MCA I Semester Supplementary Examinations, June 2012  
INFORMATION AND COMMUNICATION TECHNOLOGY  
( For students admitted in 2011-12 )

Time: 3 hours

Max Marks: 60

*Answer any FIVE of the following  
All questions carry equal marks*

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1. a) With a neat block diagram, explain the basic operational concepts of a computer. [9M]  
b) List different types of computers and its use. [3M]
2. a) Compare and contrast Flash and Cache memory. [5M]  
b) Explain various components of primary memory. [7M]
3. Explain the organization of Magnetic hard disk and magnetic tape system. [12M]
4. a) Discuss about I/O interfaces. [7M]  
b) Discuss about communication links, in detail. [5M]
5. Explain the discrete components of a computer, in detail. [12M]
6. Explain the following terms  
i) NIC Hub    ii) Switches    iii) Bridges  
iv) Routers    v) Gateways    vi) Modems
7. a) Write the TCP segment format and explain. [5M]  
b) Explain the concept of e-mail in detail. [7M]
8. Explain the concept of dynamic web pages with an example. [12M]

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Code : 1P2B11

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES :: RAJAMPET  
(AUTONOMOUS)

MCA I Semester Supplementary Examinations, June 2012  
MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

( For students admitted in 2011-12 )

Time: 3 hours

Max Marks: 60

Answer any FIVE of the following  
All questions carry equal marks

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1. a) Obtain the principal conjunctive normal form of  $(\neg P \rightarrow R) \wedge (Q \Leftrightarrow P)$ .  
b) Show that following equivalence without constructing Truth Table.  
 $\neg(P \leftrightarrow Q) \Leftrightarrow (P \wedge \neg Q) \vee (\neg P \wedge Q)$   
c) Show that the truth value of the following formula is independent of the individual components.  $((P \rightarrow Q) \wedge (Q \rightarrow R)) \rightarrow (P \rightarrow R)$
2. a) Express the following statements using predicates.  
i) All human beings are mortals.  
ii) Jack is taller than Jill.  
iii) Susan sits between Ralph and Bill.  
b) Show that  $(x)(P(x) \rightarrow Q(x)) \rightarrow Q(x) \wedge (x)(Q(x) \rightarrow R(x)) \Rightarrow (x)(P(x) \rightarrow R(x))$
3. a) What is Venn diagram? Show the following using Venn diagrams.  
i)  $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$ .  
ii)  $A \cap \sim A = \emptyset$   
b) Give examples of sets A,B,C such that  $A \cup B = A \cup C$ , but  $B \neq C$ .  
c) Show that for any two sets  $P(A) \cup P(B) \subseteq P(A \cup B)$
4. a) Let  $(L, \leq)$  be a lattice for any  $a, b, c \in L$ , show that  
$$b \leq c \Rightarrow \left\{ \begin{array}{l} a * b \leq a * c \\ a \oplus b \leq a \oplus c \end{array} \right\}$$
  
b) Define a Poset. Draw the Hasse diagram for  $(A, \leq)$  where  $A =$  the set of factors of 12 and  $\leq = \{(x, y) \mid x \in A \wedge y \in A \wedge (x \text{ divides } y)\}$   
c) Using recursion, define the multiplication function  $*$ , on integers, given by  $g(x, y) = x * y$ .
5. Write short notes on the following  
a) Groups and sub-groups.  
b) Semi groups and Homomorphism of groups.

6. a) What is the coefficient of  $x^3y^7$  in  
i)  $(x + y)^{10}$  ii)  $(2x - 9y)^{10}$
- b) A certain computer center employs 100 computer programmers. Of these 47 can program in C, 35 in Pascal and 23 in both. How many can program in  
i) Neither of the two languages.  
ii) Exactly in one language.
- c) Use the principle of inclusion-exclusion to determine the number of prime integers less than 400.
7. a) There are 3 pegs and  $n$  circular discs of increasing diameter. On one peg with the largest disk on the bottom. These discs are to be transferred one at a time on to another peg with the provision that at no time one is allowed to put a larger disc on one with smaller diameter. Determine the number of moves required. (Hint: form recurrence relation for the number of moves and solve.)
- b) Find the coefficient of  $x^{14}$  in  $(x^2 + x^3 + x^4 + x^5 + x^6 + x^7)^4$ .
8. a) Define a planar graph. Suppose that we have 5 houses and 2 utility outlets, situated so that each utility outlet is connected to each house. Is it possible to connect each utility to each of the 5 houses without lines or mains crossing each other? If so, give the connection diagram ( graph).
- b) With an example explain the Kruskal's algorithm for determining the minimal spanning tree of a graph.

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**Code : 1P2C13**

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES :: RAJAMPET  
(AUTONOMOUS)**

**MCA I Semester Supplementary Examinations, June 2012**

**PROBABILITY AND STATISTICS**

**( For students admitted in 2011-12 )**

**Time: 3 hours**

**Max Marks: 60**

*Answer any FIVE of the following  
All questions carry equal marks*

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1. a) Define conditional probability and state and prove Bayes theorem.  
b) Two digits are selected at random from the digits 1 through 9. If the sum is even, find the probability that both numbers are odd.
  
2. a) If X is a continuous random variable and K is a constant, then prove that  
i)  $\text{var}(X+K) = \text{var}(X)$     ii)  $\text{var}(KX) = K^2\text{var}(X)$ .  
b) Let X denote the minimum of the two numbers that appear when a pair of fair dice is thrown once. Determine  
i) Discrete probability distribution    ii) Expectation    iii) Variance.
  
3. a) Fit a binomial distribution to the following frequency distribution.  

x:	0	1	2	3	4	5	6
f:	13	25	52	58	32	16	4

  
b) In a certain factory turning out razor blades, there is a small chance of 0.002 for any blade to be defective. The blades are supplied in packets of 10, use Poisson distribution to calculate the approximate number of packets containing no defective, one defective and two defective blades respectively in a consignment of 10,000 packets.
  
4. a) The following are the times between six calls for an ambulance in a city and the patients arrival at the hospital ; 27, 15, 20, 32, 18 and 26 minutes. Use these figures to judge the reasonableness of the ambulance services claim that it takes on the average 20 minutes between the call for an ambulance and patient's arrival at the hospital.  
b) A random sample of 400 items is found to have mean 82 and S.D. 18. Find the maximum error of estimation at 95% confidence interval. Find the confidence limits for the mean if  $\bar{x}=82$ ?
  
5. a) Two horses A and B were tested according to the time (in seconds) to run a particular track with the following results.  

Horse A:	28	30	32	33	33	29	34
Horse B:	29	30	30	24	27	29	

  
Test whether the two horses have the same running capacity at 5% level of significance.

- b) In a locality 100 persons were randomly selected and asked about their educational achievements. The results are given as follows.

Education	Middle	High School	College	Total
Sex				
Male	10	15	25	50
Female	25	10	15	50
Total	35	25	40	100

Can you say that the education depends on sex? The value of  $\psi^2$  on 5% level of significance for 2 d.o.f = 5.99.

6. a) Explain the procedure generally followed in testing of hypothesis.  
 b) Random samples of 400 men and 600 women were asked whether they would like to have a flyover near their residence. 200 men and 325 women were in favour of the proposal. Test the hypothesis that proportions of men and women in favour of the proposal are same at 5% level of significance.
7. a) Find the least squares regression equation of  $X_1$  on  $X_2$  and  $X_3$  from the following data.

$X_1$ :	3	5	6	8	12	14
$X_2$ :	16	10	7	4	3	2
$X_3$ :	90	72	54	42	30	12

- b) The regression equations of two variables  $x$  and  $y$  are  $x - 0.7y = 5.2$ ,  $y - 0.3x = 2.8$ . Find the mean of the variables and the coefficient of correlation between them.
8. At a railway station, only one train is handled at a time. The railway yard is sufficient only for two trains to wait while other is given signal to leave the station. Trains arrive at the station at an average rate of 6 per hour and the railway station can handle them on an average of 12 per hour. Assuming Poisson arrivals and exponential service distribution, find the steady state probabilities for the various number of trains in the system. Find also the average waiting time of a new train coming into the yard.

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