**Total No. of Questions : 4]** **[Total No. of Pages : 3**

**P1161** **[4040]-403**

# M.C.A. (Under Science Faculty)

## CS - 403 : DISTRIBUTED DATABASE SYSTEMS

## (2008 Pattern) (Sem. - IV) (New)

***Time : 3 Hours***] [***Max. Marks : 80***

***Instructions to the candidates :***

1) ***Figures to the right indicate full marks.***
2) ***Neat Diagrams must be drawn whenever necessary.***
3) ***All questions are compulsory.***

***Q1)*** Attempt the following: **[8 × 2 = 16]**

a) State the different promises of DDB.

b) What are programming in small & programming in large.

c) Define :
   i) Primary Horizontal Fragmentation.
   ii) Attitude Affinity Matrix.

d) What are types of transaction?

e) What is difference bet 2PL & strict 2PL locking protocol.

f) What is Query Decomposition? List different steps in query decomposition.

g) What is advantage & disadvantage of replication?

h) What is write Ahead logging protocol?

***Q2)*** Attempt <u>any four</u> of the following : **[4 × 5 = 20]**

a) What is distributed DBMS? What are problem areas of DDBMS?

b) Explain the difference between MDBS with GCS & MDBS without GCS.

c) Write a note on Top-down approach.

d) Write a note on layers of query processor.

e) Explain detailed model of the distributed execution monitor.

***P.T.O.***

***Q3)*** Attempt <u>any four</u> of the following: **[4 × 6 = 24]**

a) Let Q ={*q*1, q2, q3, q4, q5} be the set of queries A = {A1, A2, A3, A4, A5} be the set of Attributes S = {S1, S2, S3} be the set of sites.

Matrix A describes attribute usage values & Matrix B gives application access frequencies assume that ref: qk = 1 A qk & si & that A4 is the key attribute.

Use Bond Energy & vertical partitioning algorithms to obtain vertical fragments of set of attributes in A.

**Matrix A**

| | A1 | A2 | A3 | A4 | A5 |
|---|---|---|---|---|---|
| q1 | 0 | 1 | 1 | 1 | 0 |
| q2 | 1 | 1 | 1 | 0 | 0 |
| q3 | 1 | 1 | 0 | 0 | 0 |
| q4 | 0 | 0 | 0 | 1 | 1 |
| q5 | 0 | 0 | 1 | 1 | 1 |

**Matrix B**

| | S1 | S2 | S3 |
|---|---|---|---|
| q1 | 20 | 4 | 0 |
| q2 | 25 | 10 | 0 |
| q3 | 15 | 0 | 0 |
| q4 | 0 | 0 | 30 |
| q5 | 0 | 20 | 25 |

b) Transformation the following query into optimized operators tree.

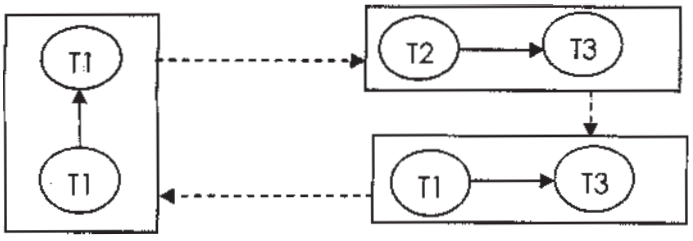
Select Iname, Inv_no

From in.amt>50000

And Itn.itno=I.itno

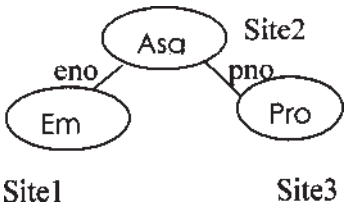
And (I.Iname = “Grocery” OR Itn.qty=200) and Itn.Inv_no=In.Inv_no

c) Consider the following DWFG given below




Detect the deadlock using the distributed deadlock diagram.

d) Consider the join graph given below for the relational algebra query proj* pw Asg Emp




Using the information given below, describe a join program that will need minimum data transfer

Size (Emp) = 1500 Size(Asg*Emp) = 3500
Size (Asg) = 2500 Size (Asg*Proj) = 2500
Size (proj) = 3500

e) Simplify the following query using idem potency rules.
Select Eno
From Asg where Resp = "Analyst"
And
And NOT (Pno = "P2" or dur=12)
And Pno ≠ "P2"
And dur=12

***Q4)*** Attempt <u>any four</u> of the following : **[4 × 5 = 20]**

a) Differentiate between PC2PL, C2PL & D2PL.

b) Write a note on query optimization

c) Write a note on Basic to algorithm

d) Explain the following LRM algorithms
i) No fix/No flush.
ii) No fix/flush

e) What is deadlock? How deadlock can be managed?

■■■

**Total No. of Questions : 4]** **[Total No. of Pages :2**

# P 1162 [4040] - 404

## M.C.A. (Under Science Faculty)

## CS - 405 : Object Oriented Software Engineering

## (Sem. - IV) (2008 Pattern) (New)

***Time : 3 Hours]*** ***[Max Marks : 80***

***Instructions to the candidates :***

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Neat Diagram must be drawn whenever necessary.***

***Q1)*** Attempt the following: **[8 × 2 = 16]**

a) What is forward Engineering.

b) Write the difference between aggregation and association.

c) What is the use of extends relation in use case diagram.

d) Which are the components in an interaction diagram.

e) What is the significance of role names in an object diagram.

f) What are packages.

g) Specify the types of testing.

h) Briefly explain the Inception concept.

***Q2)*** Attempt any four of the following: **[4 × 8 = 32]**

a) A system for distributing electronic mail over network is needed. Each user of the system should be able to send mail from any computer. All the received mails are stored at a central server. The user can receive mail at any computer. One or Two machines with larger data space also allow saving messages in files. There should be provisions for forwarding mail and sending mail to several users at once using address list. Draw the component and deployment diagram. Also specify the functionalities supported by each component.

b) Draw a DFD for Railway Reservation system. The passenger is required to fill in a reservation form for giving details for his journey. The counter clerk ensures whether the place is available and prepares a booking statement.

c) Prepare a class diagram giving the attributes and operations and state transition diagram for both stack and queue.

d) Draw state diagram and sequence diagram for considering different scenarios for mobile handset selection.
e) Draw a use case diagram for 'Bus reservation system'.

***Q3)*** Attempt any four of the following: **[4 × 4 = 16]**

a) How are test cases designed for Object Oriented Software.

b) Draw a sequence diagram for issuing books.

c) Discuss inheritance and its types and polymorphism.

d) Write a note on UP phases.

e) Explain UML architecture.

***Q4)*** Attempt any four of the following: **[4 × 4 = 16]**

a) Explain the steps involved in OOAD.

b) Explain inter class test case design.

c) Write a note on Generic components of OO Design model.
d) Discuss importance and principles of modeling.
e) Write a note on Agile modeling.

⌘⌘⌘

**Total No. of Questions : 5]** **[Total No. of Pages : 3**

**P1159**

# [4040]-401
## M.C.A. (Under Science Faculty)
## CS : 401 - INTRODUCTION TO UNIX AND UNIX INTERNALS
## (2008 Pattern) (New) (Sem. - IV)

***Time : 3 Hours]*** ***[Max. Marks : 80***

***Instructions to the candidates:***

1) ***Figures to the right indicates full marks.***
2) ***Neat diagram must be drawn whenever necessary.***
3) ***All questions are compulsory.***

***Q1)*** Attempt all : **[8 × 2 = 16]**

a) Give any two differences between interrupts and exceptions.
b) In sending signal from processes what happens if
   i) Pid is positive integer.
   ii) Pid is negative integer but not - 1.
c) Give any two reasons by which the kernel swaps a process out, if it needs space in memory.
d) Explain any two time related system calls.
e) Directory entry contains '.' and '..', what do they represent.
f) What is Delay Write?
g) What do you mean by shell meta-characters?
h) What are the contents of u-area of a process?

***Q2)*** Justify : True/False, Attempt any four : **[4 × 4 = 16]**

a) Process 1 is a user level process as oppose to process 0.
b) Text region and data region can be merged into one region.
c) If a signal is sent to a process which is running in kernel mode, it has an instant effect on process.
d) Pipe size increases with every read and every write.
e) A successful exec () system call never returns.

***Q3)*** Attempt any four : **[4 × 4 = 16]**

a) Calculate Block number and Byte offset into block for inode number 539. Assuming that block 2 is beginning of the inode list, each disk inode is of 64 byte and one disk block is of 1KB.
b) Explore the race condition for a locked buffer in algorithm getblk.
c) Give syntax of mount and umount system call. Show the contents of mount table entry.

***P.T.O.***

d) If a process executing in kernel mode receives a signal that it had previously decided to catch, then what kernel does when that process is about to return to user mode?

e) Explain how protection fault is handled in demand paging system.

***Q4)*** Attempt any four : **[4 × 4 = 16]**

a) Write a shell script to print permission of a given file taken as command-line argument.

b) Explain the behaviour of the following program.

```
main (argc, argv)
int argc, char * argv[];
{
exec (argv[0], argc[0], 0);
}
```

c) Write a C program where parent and child do not share file.

d) Explain the behaviour of the following program :

```
# include < string.h>
char str[] = "Pipe demo";
main()
{
        int i;
        int pip[2];
        char buff[25];
        pipe(pip);
        if(fork() = = 0)
{
                close(0);
                dup (pip[0]);
                for(;;)
                        if ((read(0, buff, 25)) = = 0)
                                break;
}
else
{
                close(1);
                dup(pip[1]);
                for(i = 0;i<20;i++)
                        write(1, str, strlen(str));
        }
}
```

e) Write the output of the following program with explanation.

```
main()
{
        int i=0;
        for (i=0; i< 2; i++)
        {
                fork();
                printf("\n I am process at i =%d\n", i);
        }
        if(fork() = = 0)
                printf("\n This is a child process.");
}
```

***Q5)*** Attempt <u>any four</u> : **[4 × 4 = 16]**

a) Describe all the conditions where reference count of inode can be greater than 1.

b) What is the context of a process? What are different situations under which kernel needs to save the context of a process?

c) Explain the procedure of detaching a Region from a process.

d) What are three different ways in which a process can respond 'death of child' signal?

e) Explain in brief functions performed by clock interrupt handler.

**Total No. of Questions : 5]** **[Total No. of Pages : 2**

**P1160**

# [4040]-402
## M.C.A. (Under Science Faculty)
## CS : 402 - ADVANCED NETWORKING AND MOBILE COMPUTING
## (2008 Pattern) (New) (Sem. - IV)

***Time : 3 Hours]*** ***[Max. Marks : 80***

***Instructions to the candidates:***

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Draw neat diagram whenever necessary.***

***Q1)*** Attempt all of the following : **[8 × 2 = 16]**

a) List the applications of mobile communication.
b) What is anonymous FTP?
c) List the requirements of mobile IP.
d) Write any two differences between BSS and ESS.
e) Give the reasons of handover in cellular system.
f) Define soket address.
g) State the near and far terminal problem.
h) What are the uses of UDP.

***Q2)*** Attempt any four of the following : **[4 × 4 = 16]**

a) Discuss the connection establishment process of TCP.
b) Explain any two scenarios of e mail architecture.
c) Explain wireless transaction protocol with its classes.
d) What is multipath propagation? Also define short term and long term fadding.
e) Discuss the working, advantages and disadvantages of M-TCP.

***Q3)*** Attempt any four of the following : **[4 × 4 = 16]**

a) Draw and explain bearer and tele services reference mode.
b) Explain the architecture of bluetooth.
c) What is encapsulation? Discuss generic routing encapsulation.
d) Explain the services of stream control transmission protocol.
e) How traingular routing problem is solved in mobile-IP?

***P.T.O.***

***Q4)*** Attempt any four of the following : **[4 × 4 = 16]**

a) Describe the functions of the two FTP connections.

b) What is transparent bridge? Explain the learning process of bridge.

c) Explain the fundamental differences between wired network and ad-hoc wireless network related to routing.

d) How does I-TCP isolate problems on the wireless link? What are the main drawbacks of this isolation?

e) What is resolution? Explain recursive and iterative resolution.

***Q5)*** Attempt any four of the following : **[4 × 4 = 16]**

a) Explain the request and response messages of HTTP.

b) Explain the working of network and switching subsystem of GSM.

c) Compare TDMA and CDMA.

d) Discuss the detail scenario of mobile terminated call.

e) Explain how TCP handles the congestion.

**Total No. of Questions : 5]** **[Total No. of Pages :4**

**P817**

# [4040] - 101
# M.C.A. - I (Under Science Faculty)
# COMPUTER SCIENCE
## CS - 101 : 'C' Programming
## (Sem. - I) (2008 Pattern) (New)

***Time : 3 Hours]*** ***[Max. Marks :80***

***Instructions to the candidates:***

1) ***All questions are compulsory.***
2) ***All questions carry equal marks.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

***Q1)*** a) Trace the output (any two) **[2 × 4 = 8]**

i)
```
# define PROD (a) (a * a)
main ( )
{ int p = 3, q, r ;
      q = PROD (P++) ;
      r = PROD (++P) ;
      printf ("%d \t %d", q, r) ;
}
```

ii)
```
int foo (int * k)
{     *k + = 4 ;
      return (3 * (*k) –1) ;
}
main ( )
{     int p = 10, S ;
      S = foo ( & p) + p/2 ;
      printf ("%d \ t %d", p, s) ;
}
```

iii)
```
main ( )
{     int a = 0, b = 3, c ;
      if (a && ++ b)
                  c = a ;
      else
                  c = b ;
      printf ("%d \ t %d", b, c) ;
}
```

***P.T.O.***

b) Find out the error and explain (any two) : **[2 × 4 = 8]**

i)
```
main ( )
{   typedef struct
        {int i;} aaa
    struct aaa * b;
}
```

ii)
```
main ( )
{   float a = 3.5 ;
    switch (a) ;
    {
     case 0.5 : printf (" Let 45 c" ) ;
     case 1.0 : printf (" Welcome") ;
                break ;
     case 2.5 : printf (" The art of C") ;
    }
}
```

iii)
```
main ( )
{   int a ( ] = {2, 4 ,6, 8}
    int i ;
    for (i = 0; i < = 7 ; i++) ;
    {   * ( i + a) = a [i] ++ ;
        printf ("\n%d", i [a]) ;
    }
}
```

***Q2)*** Attempt any four of the following : **[4 × 4 = 16]**

a) Explain with suitable example, how masking and unmasking of bits is actieved in 'C' using bitwise operators.

b) What is nested structure? Explain with suitable example self referencing structure.

c) What is the purpose of storage classes? Explain with suitable example automatic and static storage class.

d) Differentiate between while and do while structures.

e) Explain the purpose of each of the following declaration.

i) int ∗ foo (int a [ ]) ;

ii) int ∗ foo (int (∗ a) [ ]) ;

iii) int ∗ foo (int ∗ a [ ]) ;

iv) int ∗ foo (int (∗ a) [ ]) ;

***Q3)*** Attempt any four of the following : **[4 × 4 = 16]**

a) Write C program to reverse the strings stored as array of pointers to string. Write a function Xstrrev( ) which reverse the contents of one string.

b) Write a C program to obtain the sum of first n terms of the following series :

$$1 + (a + 1)^1 + (a + 2)^2 + (a + 3)^3 + (a + 4)^4 + .....$$

c) Write a C program to print maximum element in the given row of a M × N matrix.

d) Write a recursive C function to compute m ∗ n for two integers m and n.

e) Write a C program using command line argument to create a file 'student.dat', containing student information. Encrypt the file and store in 'enc.dat' file, using encryption key (character + 3). Display both the files.

***Q4)*** Attempt any four of the following : **[4 × 4 = 16]**

a) Explain different forms of ++ and – –.

b) What is the purpose of sprintf and sscanf ? How it is different from scanf and printf ?

c) i) Convert the following conditional operator into nested if else.

a > 5 ? (b > 3 ? c = 9 : c = –9) : c = 12

ii) Write a C expression for the following

$$\frac{8\chi^2 + 15\chi + 4}{2\chi + 3}$$

d) Write a C program to create rectangle of size specified by user and colors it using red color.

e) Write a C program for converting binary number to decimal number.

***Q5)*** Attempt any four of the following : **[4 × 4 = 16]**

a) Write a C program to accept book information (book no, author name, book name, price) for n books and display them in ascending order of price.

b) Write a C program to take file name from uses and print the content of file in reverse.

c) Write a C program to print summation of all even numbers in the array and display their average.

d) What are the advantages of static memory allocation over dynamic memory allocation.

e) Why C is called as middle level lunguage? Structured language?

**Total No. of Questions : 5]** **[Total No. of Pages :2**

**P818**

# [4040] - 102
# M.C.A. - I (Science Faculty)
## CS - 102 : COMPUTER ARCHITECTURE
## (Sem. - I) (2008 Pattern) (New)

***Time : 3 Hours]*** ***[Max. Marks :80***

***Instructions to the candidates:***

1) ***All questions are compulsory.***
2) ***Draw neat diagram wherever necessary.***
3) ***Figures to the right indicate full marks.***

***Q1)*** Attempt any four of the following : **[4 × 4 = 16]**

a) Explain Half adder using AND gate & EX-OR gate.

b) What is the function of following registers of Microprocessor in real mode operation.

i) Code Segment

ii) Accumulator

iii) Data Segment

iv) Source Index

c) State the features of EISA Bus.

d) Explain 4-bit Binary weighted Digital to Analog (DAC) converter.

e) What is parallel processing? Explain the concept of pipeline processing.

***Q2)*** Attempt any two of the following : **[2 × 8 = 16]**

a) Explain strobe controlled asynchronous data transfer what is its disadvantage? How is it overcome in Handshaking data transfer?

b) Explain following addressing modes with an example.

i) Direct

ii) Register

iii) Register Indirect

iv) Based

c) State the characteristics of CISC and RISC architecture.

***P.T.O.***

*Q3)* Attempt any four of the following : **[4 × 4 = 16]**

a) Explain 3 : 8 Decoder using logic gates.

b) Explain any two components of microprocessor.

c) Draw the block diagram of I/O interface. Explain working of each block.

d) State different parallel processing mechanisms of Uniprocessor system. Explain any one.

e) Explain PCI bus in I/O organization.

*Q4)* Attempt any four of the following : **[4 × 4 = 16]**

a) Explain synchronous Vp counter using three flip-flops.

b) What is interrupt? Explain Non-maskable Interrupt (NMI) and Interrupt Request (INTR).

c) Explain successive approximation ADC.

d) Explain 4 segment Instruction pipelining.

e) What are the features of pentium-pro microprocessor?

*Q5)* Attempt any two of the following : **[2 × 8 = 16]**

a) Explain with neat logic diagram J-K flip-flop. How is it converted in to 'D' flip-flop and 'T' flip-flop.

b) i) What does 'VESA' stands for in I/O interfacing? What are its advantages and disadvantages?

ii) Explain working of DMA controller.

c) Explain control word format for I/O mode of IC 8255.

**Total No. of Questions : 5]** **[Total No. of Pages :3**

**P819**

# [4040] - 103

## M.C.A. (Under Science Faculty)

### CS - 103 : MATHEMATICAL FOUNDATION

### (Sem. - I) (2008 Pattern) (New Cource)

***Time : 3 Hours]*** ***[Max. Marks :80***

***Instructions to the candidates:***

1) ***All questions are compulsory.***
2) ***All questions carry equal marks.***
3) ***Figures to the right indicates full marks.***
4) ***Use of non programmable scientific calculator is allowed.***

***Q1)*** Attempt any four of the following : **[16]**

a) Define following terms with proper example.

i) Cardinality of set.

ii) Compliment of set.

iii) Power set.

iv) Cross product of two sets.

b) For any three sets A, B and C prove that. $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$.

c) Let C is set of all circles in a plane, define binary relation $R : C \rightarrow C$ as ${}^{4}R_{C_2}$ If and only if $C_1$ and $C_2$ are co-centric circles, for $C_1$ and $C_2 \in C$. Then prove that R is equivalence relation also find equivalence class of circle $(x - 1)^2 + (Y)^2 = 4$.

d) If A is set of all positive integers and B is set of all negative integers. Then find.

i) $A \cup B$

ii) $A \cap B$

iii) $A - B$

iv) $(A \cup B) - (A \cap B)$.

e) If A is set of n elements then prove that cardinality of power set of A is $n_{C_0} + n_{C_1} + n_{C_2} + - - - - + n_{C_n}$.

***P.T.O.***

***Q2)*** Attempt any four of the following : **[16]**

a) Determine truth value of the following composite statement.

i) If two circles are co-centric then there exist at least one common point between these two circles.

ii) It is not case that n or $n^2$ is odd.

iii) Triangle and square has three angles.

iv) Water is solid or gold is liquid.

b) Determine whether the preposition

$(a \rightarrow b) \wedge (a \rightarrow c)$ is tautology, contradiction or contengent.

c) Prove or disprove the following equivalence.

$p \vee (q \wedge r) \equiv (p \vee q) \wedge (p \vee r)$

d) Test validity of following without using truth table

$d \vee \sim e, \sim e \rightarrow f, d \rightarrow \sim g$

e) Using indirect method of proof prove that. "$\sqrt{7}$ is irrational number.

***Q3)*** Attempt any four of the following : **[16]**

a) Determine whether Q (set of rationals) is a group with respect to following binary operation $*$ on Q defined as

$$a * b = \frac{a \cdot b}{2},\ a, b \in Q.$$

b) Let $G = \left\{ \begin{bmatrix} a & b \\ c & d \end{bmatrix} / a,b,c,d \in Z \right\}$. $*$ is usual matrix addition. Then check whether.

i) (G, *) is monoid. ii) (G, *) is semigroup.

iii) (G, *) is group. iv) (G, *) is abelian group.

c) Let (G, *) is group then prove that $(a * b)^{-1} = b^{-1} * a^{-1}$.

d) Define symmetric group. Find all elements of $S_3$ (symmetric group of 3 elements), also find their inverses.

e) If G is a group such that $(a \cdot b)^2 = a^2 \cdot b^2$ for any three consecutive integers. Show that G is abelian group.

***Q4)*** Attempt any four of the following : **[16]**

a) Prove that $f(x) = x^2 + 5x + 6$ and $g(x) = x^2 - 16$ are relatively prime polinomials.

b) If a | b and c | d then prove that ac | bd.

c) Find g. c. d of 243 and 198 also find $x$ and $y$ so that
$(243, 198) = (243)\,x + (198)\,y$.

d) If $a \equiv b \pmod n$ and $c \equiv d \pmod n$. then prove that
i) $a^x \equiv b^x \pmod n$
ii) $a \cdot c \equiv b \cdot d \pmod n$.

e) Find remainder after dividing to
$7^{200} + 11^{800}$ by 101.

***Q5)*** Attempt any four of the following : **[16]**

a) If $\sigma = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 \\ 1 & 4 & 6 & 5 & 2 & 3 \end{pmatrix}$ and

$\tau = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 \\ 3 & 4 & 2 & 1 & 6 & 5 \end{pmatrix}$ then

show that $\sigma\tau \neq \tau\sigma$.

Hence find $\sigma\tau\sigma^{-1}$.

b) Find value of 'a' so that system has unique solution
$x + 2y - z = 2$
$2x + y - 2z = 1$
$z + y + az = 1$.

c) Find g.c.d. of following polynomials by using Euclidian algorithm.
$f(x) = x^3 + 2x^2 - 5x - 6$.
$g(x) = x^2 - 1$.

d) Using quantifiers symbolize the following. If the universe of discourse is the set of real numbers.
i) For any real value of $x$, $x^2$ is atmost equal to 10.
ii) There is some $x$ such that $x^2 + 3x - 2 = 0$.
iii) For any value of $x$, there is some value of $y$ such that $x \cdot y = 1$.
iv) There is value of $x$ and $y$ such that $x^2 + y^2$ is negative.

e) Find inverse of following matrix A by adjoint method. Where

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 5 & 3 \\ 1 & 0 & 8 \end{bmatrix}.$$

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**Total No. of Questions : 5]** **[Total No. of Pages :4**

**P820**

# [4040] - 104
# M.C.A. - I (Under Science Faculty)
# MATHEMATICS
## CS - 105 : Graph Theory
## (Sem. - I) (2008 Pattern) (New Course)

***Time : 3 Hours]*** ***[Max. Marks :80***

***Instructions to the candidates:***

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***All questions are compulsory.***
3) ***Figures to the right indicate full marks.***
4) ***All question carry equal marks.***

***Q1)*** Attempt <u>any four</u> of the following : **[16]**

a) i) Is the degree sequence {1, 1, 2, 2, 3, 5, 7} graphical? Justify your answer.

ii) Give example of a graph which is complete as well as complete bipartite.

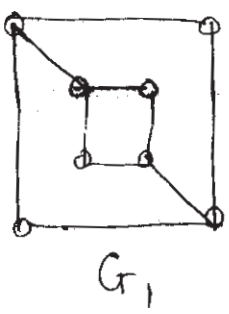
b) i) If G is a graph on n vertices which does not have any cut vertex, then what is the vertex connectivity of G?

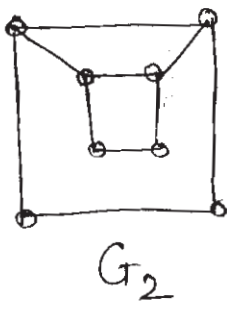
ii) Draw a digraph D which is neither symmetric nor asymmetric.

c) i) Draw all non-isomorphic trees on 4 vertices.

ii) Does there exist a graph having center containing 3 vertices? Justify your answer.

d) Check whether the given graphs $G_1$ and $G_2$ are isomorphic.



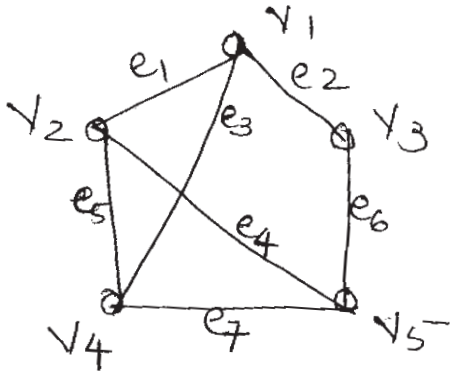




e) Solve the recurrence relation
$a_n = 2a_{n-1}$, $a_0 = 1$.

***P.T.O.***

***Q2)*** Attempt <u>any four</u> of the following : **[16]**

a) Find incidence matrix and adjacency matrix of the following graph




b) Draw the following graphs.

i) 3-regular graph on 8 vertices.

ii) Complete bipartite graph on 7 vertices.

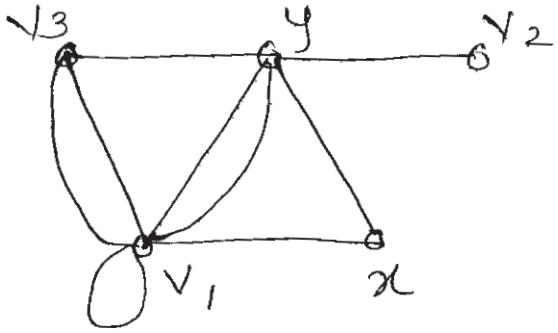
c) If G is a self complementary graph on n vertices, then show that n is of the type 4k or 4k + 1 for some integer k.

d) Define the following

i) Vertex deleted subgraph

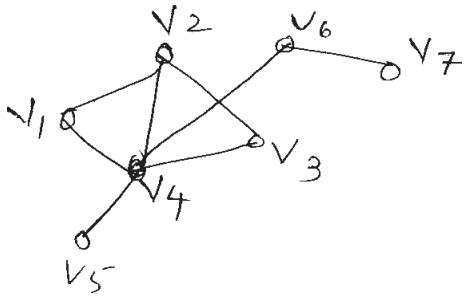
ii) Hamiltonian graph

e) Fuse the vertices *x* and *y*.




***Q3)*** Attempt <u>any four</u> of the following : **[16]**

a) Define a bridge state necessary and sufficient condition for an edge to be a bridge. Find all the bridges in G.



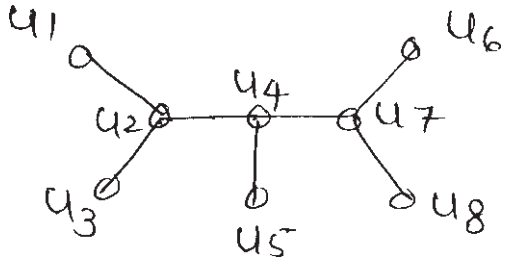
b) Draw the following graphs. G having property

i) $\lambda(G) > k(G) > \delta(G)$

ii) $\lambda(G) = k(G) > \delta(G)$

c) Write Dijkstra's algorithm to find shortest path between two vertices of a connected graph.

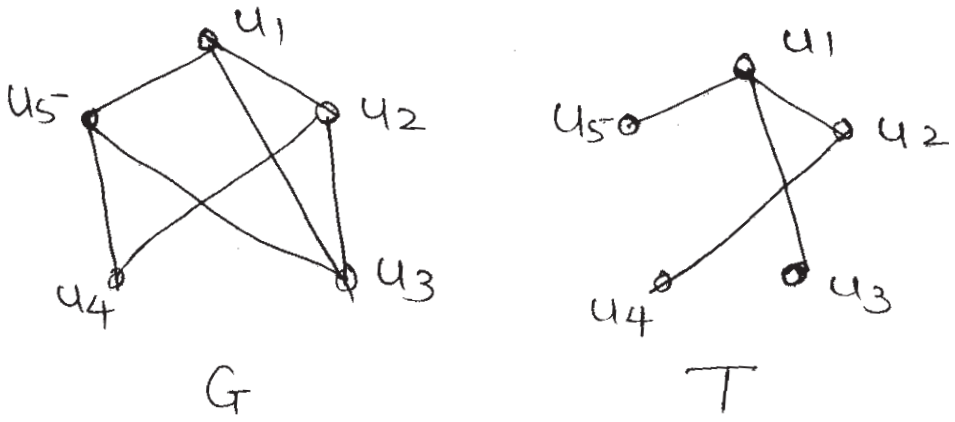
d) Find eccentricities of all the vertices of G, and hence find the center of G.




e) Let G be a simple r-regular graph with e edges. Prove that if r is odd then r divides e.

***Q4)*** Attempt <u>any four</u> of the following : **[16]**

a) Find all the fundamental cutsets of G with respect to its spanning tree T.

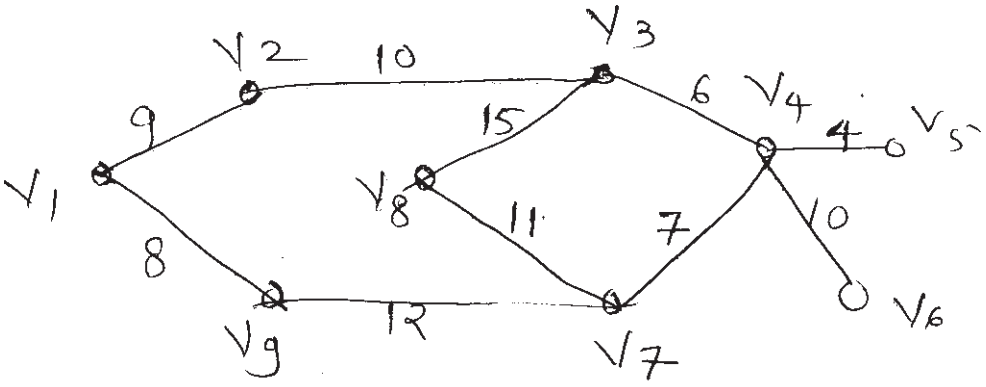



b) If G is a connected graph on n vertices then show that G is a tree if and only if G has (n – 1) edges.

c) If G is a complete asymmetric digraph on n vertices then show that G contains $\frac{n(n-1)}{2}$ number of directed edges.

d) If T is a binary tree on n vertices, then find minimum height and maximum height of T.

e) Using Kruskal's algorithm, find minimal weight spanning tree of G.




***Q5)*** Attempt <u>any four</u> of the following : **[16]**

a) Draw arborescence for the following expression and express it in polish notation.

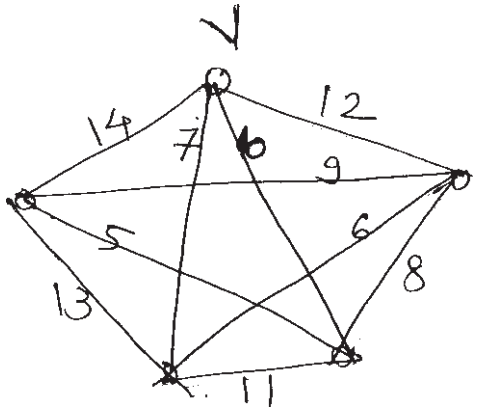
$t + (u * v) / (w + x - y \uparrow z)$

b) Solve the following recurrence relation.

$a_{n+2} + 2a_{n+1} + a_n = 9$; $a_0 = 0$, $a_1 = 1$.

c) If G(V, E) is disconnected graph then prove that Vertex set V can be partitined into two disjoint subsets. $V_1$, $V_2$ such that there is no edge eEE having one end vertex in $V_1$ and the other end vertex in $V_2$.

d) Solve the travelling salesman problem for a sales person based at v in the following graph.




e) Define :

i) Strongly connected digraph

ii) Weakly connected digraph

Prove that every strongly connected digraph is weakly connected.

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**Total No. of Questions : 5]** **[Total No. of Pages :2**

**P821**

# [4040] - 201
# M.C.A. (Science Faculty - I)
# COMPUTER SCIENCE
## CS - 201 : Data & File Structures Using 'C'
## (Sem. - II) (2008 Pattern) (New)

***Time : 3 Hours]*** ***[Max. Marks :80***

***Instructions to the candidates:***

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***All questions carry equal marks.***

***Q1)*** Attempt any four of the following : **[4 × 4 =16]**

a) Define a linked list with its node structure. Discuss how insertion & deletion of a node are performed in it.

b) What do you mean by tree traversal? Explain its types.

c) Define a diagraph. Explain adjacency list with suitable example.

d) Write a function for insertion sort.

e) Define file organization. Discuss advantages of index file organization.

***Q2)*** Attempt any four of the following : **[4 × 4 = 16]**

a) Explain how dynamic implementation of stack is efficient than its static implementation.

b) Explain how polynomial addition can be performed.

c) Construct AVL tree for the given data set
(13, 15, 20, 10, 9, 12, 11, 17.)

d) Define hash function. Discuss any three uniform hash functions.

e) Describe clustered & non- clustered indices.

***Q3)*** Attempt any four of the following : **[4 × 4 = 16]**

a) Evaluate a given postfix expression by representing stepwise stack contents.
postfix expression = pq $*$ rs / + where p = 5 q = 3, r = 10, s= 2.

b) Write a function to delete a node from a singly linked list.

c) Describe with example - complete binary tree & an expression tree.

d) Write an algorithm for merge sort.

e) Write a short note on ISAM.

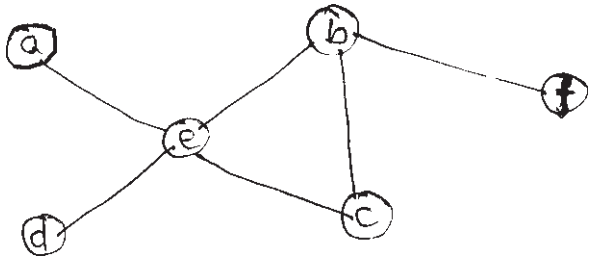
***P.T.O.***

***Q4)*** Attempt <u>any four</u> of the following : **[4 × 4 = 16]**

a) Explain priority queue.

b) Write a function to insert a node in a doubly linked list.

c) Consider a given graph. Represent it using adjacency matri x. Find the degree of each & every vertex.




d) Differentiate sparse & dense indices.

e) i) Define overflow. State any two overflow handling techniques.
ii) Define stack. State two basic stack operations.

***Q5)*** Attempt <u>any four</u> of the following : **[4 × 4 = 16]**

a) Define an array. Describe row-major & column major.

b) Write a function to delete a node from a queue using dynamic implementation.

c) Write a function to implement push stack operation dynamically & count total stack elements.

d) Write a function to create & display a circular queue.

e) Apply quick sort method on a given data set to sort in ascending order (25, 60, 50, 40, 10, 90, 80, 30).

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**Total No. of Questions : 5]** **[Total No. of Pages :3**

**P822**

# [4040] - 202
# M.C.A. - I (Science Faculty)
## COMPUTER SCIENCE
## CS - 202 : Theoretical Computer Science
## (Sem. - II) (2008 Pattern) (New)

***Time : 3 Hours]*** ***[Max. Marks :80***

***Instructions to the candidates:***

1) ***All questions are compulsory.***
2) ***All questions carry equal marks.***
3) ***Figures to the right indicate full marks.***
4) ***Neat diagrams must be drawn wherever necessary.***

***Q1)*** Attempt any four : **[4 × 4 = 16]**

a) Define

i) Equivalence relation

ii) Transitive closure

b) If A = {a, b} and B = {b, d} find

i) $(A \cup B)^*$ ii) $(A^* \cap B^*)$

c) Construct a DFA to accept the set of all strings over {0, 1} such that every pair of adjacent 0's appear before any pair of adjacent 1's.

d) Design a FA which reads strings made up of letters in the word COMPUTER and recognize those strings containing word "COM" as substring.

e) Write a regular expression for the following language :

i) Consisting of strings such that total number of b's in each string is divisible by 3 over {a, b}

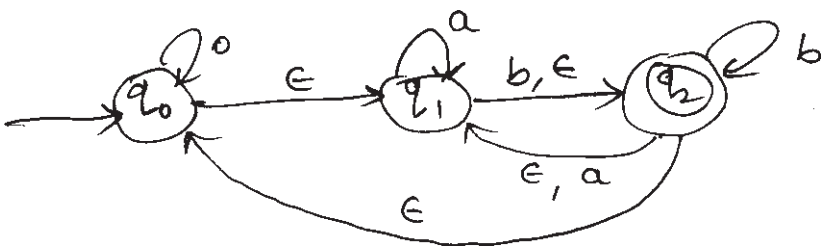
ii) Consisting of strings with total number of 0's are even over {0, 1}.

***Q2)*** Attempt <u>any four</u> : **[4 × 4 = 16]**

a) Define & Design mealy machine which outputs even or odd according to number of 1's encountered is even or odd over {0, 1}.

***P.T.O.***

b) Construct equivalent DFA for NFA of the following figure.




c) Minimize the following DFA, M = {{a, b, c, d, e, f, g, h} {0, 1} δ, a, {c}} where δ is

| | δ | 0 | 1 |
|---|---|---|---|
| | a | b | f |
| | b | g | c |
| * | c | a | c |
| | d | c | g |
| | e | h | f |
| | f | c | g |
| | g | g | e |
| | h | g | c |

d) Show that regular sets are closed under complementation with an example.

e) Construct the NFA equivalent to the following expression

(0 1 *) + ( 1 0*) · 1

***Q3)*** Attempt <u>any four</u> : **[4 × 4 = 16]**

a) i) Construct CFG which accepts set of palindromes over {a, b}.

ii) Define inherently ambiguous context free grammar.

b) Write a note on chomsky Hierarchy.

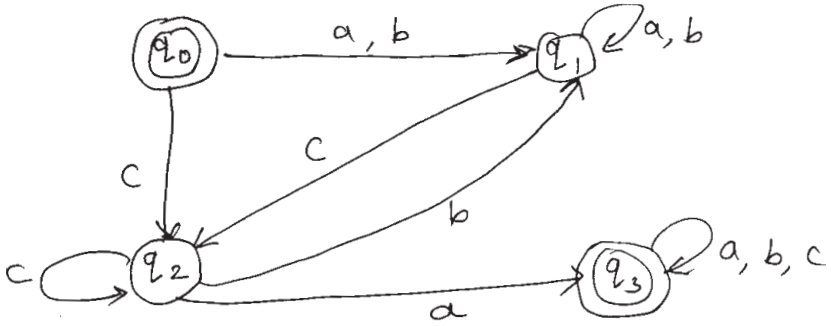
c) Convert the following grammar into chomsky normal form (CNF).

$S \rightarrow ABA$

$A \rightarrow aA \mid \in$

$B \rightarrow bB \mid \in$

d) Construct regular grammar for the following



e) Construct PDA for language

$L = \{0^n\ 1^m\ 2^{n+m} \mid n, m \geq 1\}$.

***Q4)*** Attempt <u>any four</u> : **[4 × 4 = 16]**

a) Construct a PDA equivalent to CFG

$S \rightarrow a\ S\ a \mid b\ S\ b \mid a \mid b$

b) Define DPDA. Also state the differences between PDA & FA with an example.

c) Show that the CFL's are closed under union with an example.

d) Define :

i) Pumping lemma of regular set

ii) Parse tree.

e) Show that the language

$L = \{a^n\ b^m\ c^n\ d^m \mid m, n \geq 1\}$ is not CFL.

***Q5)*** Attempt <u>any four</u> : **[4 × 4 = 16]**

a) Design a TM to accept language

$\{a^n\ b^n\ c^n \mid n \geq 1\}$.

b) Define LBA. State the differences between TM & LBA.

c) Explain halting problem of TM.

d) Explain the various forms of TM.

e) Design a TM to accept language

$L = \{a^m\ b^n \mid n \geq m\ \&\ m \geq 1\}$.

**Total No. of Questions : 5]** **[Total No. of Pages :2**

**P823**

# [4040] - 203
# M.C.A. - I (Under Science Faculty)
# COMPUTER SCIENCE
## CS - 203 : Object Oriented Programming (C++ Programming)
## (Sem. - II) (2008 Pattern)

***Time : 3 Hours]*** ***[Max. Marks :80***

***Instructions to the candidates:***

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***

***Q1)*** Attempt any four of the following : **[4 × 4 =16]**

a) Differentiate between object oriented programing and procedure oriented programming.

b) Draw and explain the structure of C++ program.

c) Explain any 4 manipulators with example.

d) What are friend functions? What are the merits and demerits of using friend function.

e) Explain 'this pointer with suitable example.

***Q2)*** Attempt any four of the following : **[4 × 4 = 16]**

a) Explain virtual function with suitable example.

b) Explain simple try and catch mechanism with suitable example.

c) Explain the following function.

i) seekp ( ) ii) seekg ( )

iii) tellg ( ) iv) tellp ( )

d) Explain class templates.

e) Write short note on iterators.

***Q3)*** Attempt any two of the following : **[2 × 8 = 16]**

a) Write a C++ program to maintain information about instructors who is a student and employee of same college.

b) Write a C++ program to illustrate the overloading of << and >> operators.

c) Write a C++ program to create a class FD account which contains members as FDNo, name, amt, int rate, maturity amount. Use parameterised constructors to set appropriate details where intrate should be default arguement. Calculate maturity amount using intrate and display all details.

***P.T.O.***

***Q4)*** Attempt any four of the following : **[4 × 4 = 16]**

a) Define a swap function template to swap two objects of same type.

b) Write short note on scope resolution operators.

c) What is a constructor? What are the characteristics of a constructor?

d) Give the rules for virtual function.

e) What is polymorphism? Explain it.

***Q5)*** Attempt any four of the following : **[4 × 4 = 16]**

a) Write a C++ program that prints successive integers 1 2 3 ..... stop num – 1 and throws an integer exception when stopnum is reached.

b) Write a C++ program to find the sum of two complex numbers. Use friend function.

c) Write a program which copies an user specified file to another user specified file. The program should be able to copy both text and binary files.

d) When is an object created? How is memory allocated to an object and what is its lifetime?

e) Trace the output

```
Class base
      { Public :
            virtual void base Fun ( ) {cout << "from base" << endl;}
      }
Class deri : public base
      {
       Public :
            void base Fun ( ) {cout << "From derived" << end l;}
      }
void SomeFunc (base * baseObj)
      {
            base Obj → base Fun ( ) ;
      }
int main ( )
{ base base Object;
  Some func (& base Object);
  deri deri Object;
   Some Func (& deri Object)
}.
```

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**Total No. of Questions : 5]** **[Total No. of Pages :3**

**P824**

# [4040] - 204
# M.C.A. - I (Science Faculty)
# COMPUTER SCIENCE
## CS - 205 : Database Management System
## (Sem. - II) (2008 Pattern) (New)

***Time : 3 Hours]*** ***[Max. Marks :80***

***Instructions to the candidates:***

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Assume suitable data, if necessary.***

***Q1)*** Attempt any four of the following : **[4 × 4 =16]**

a) What is a data model? State different data models.

b) Define an attribute. Explain types of attributes.

c) What do you mean by integrity constraint? Discuss types of constraints used in table definition.

d) What is query processing? Explain its steps with figure.

e) What do you mean by serial & concurrent schedule? State the advantages of concurrent schedule.

***Q2)*** Attempt any four of the following : **[4 × 4 = 16]**

a) Explain 2-phase locking protocol.

b) Explain types of database system users.

c) Discuss the design issues of an E-R diagram.

d) Define & discuss join types & join conditions in SQL.

e) Let R be a relation schema

R = (A, B, C, D, E, H) and

F = {A → BC, CD → E, E → C, D → AEH, ABH → BD, DH → BC}

Let X = BCD, Compute $(x)^+$ under F.

***P.T.O.***

***Q3)*** Attempt <u>any four</u> of the following : **[4 × 4 = 16]**

a) State extended features of an E.R. Discuss any two.

b) Explain how SQL provides renaming mechanism with examples.

c) Describe assertions & triggers in short.

d) Write a short note application architecture.

e) Consider the following non-serial schedule.

| S : | $T_1$ | $T_2$ |
|---|---|---|
| | read (X); | |
| | $x := X - a$; | |
| | | read (X); |
| | | $x := x + a$; |
| | write ($x$); | |
| | read ($y$); | |
| | | write ($x$); |
| | $y := y + a$; | |
| | write ($y$). | |

Is this schedule conflict serializable to a serial schedule $<T_1, T_2>$ Justify your answer.

***Q4)*** Attempt <u>any four</u> of the following : **[4 × 4 = 16]**

a) Define SQL. Discuss several parts of SQL.

b) What is an aggregate function? Discuss various aggregate functions in SQL with examples.

c) Explain loss-less join decomposition with example.

d) Define i) Redundancy ii) Metadata
iii) Schema iv) Instance

e) The following is the list representing the sequence of events in an interleaved execution of set of transactions $T_1$, $T_2$ & $T_3$ with 2PL protocol.

| Time | Transaction | Code |
|---|---|---|
| $t_1$ | $T_1$ | Lock (P, S) |
| $t_2$ | $T_2$ | Lock (Q, X) |
| $t_3$ | $T_3$ | Lock (P, X) |
| $t_4$ | $T_1$ | Lock (R, S) |
| $t_5$ | $T_2$ | Lock (P, S) |
| $t_6$ | $T_3$ | Lock (R, X) |
| $t_7$ | $T_2$ | Lock (R, S) |
| $t_8$ | $T_3$ | Lock (Q, X) |
| $t_9$ | $T_1$ | Commit |

Construct a wait-for-graph according to above requests. Is there a dead lock? Justify.

***Q5)*** a) Attempt any two of the following: **[2 × 4 = 8]**

i) Define query language. Explain it.

ii) What do you mean by dependency preserving decomposition. Write a procedure to test it

iii) Define a transaction. Explain state diagram of a transaction.

b) Attempt any two of the following : **[2 × 4 = 8]**

consider the relations :

donar (did, dname, addr)

patient (pid, pname, padd)

donar & patient are related by many to many relationship with descriptive attribute date of donation.

i) Draw an E-R diagram.

ii) Normalise & design the database with necessary constraints.

iii) Write a SQL find the number of donars of each patient.

iv) Write a SQL to display donarwise patient list in aphabetic order.

**Total No. of Questions : 4]** **[Total No. of Pages :3**

**P825**

# [4040] - 301
# M.C.A. (Science Faculty)
## CS - 301 : Design and Analysis of Algorithms
## (Sem. - III) (2008 Pattern) (New Course)

***Time : 3 Hours]*** ***[Max. Marks :80***

***Instructions to the candidates:***

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right indicate full marks.***
3) ***Assume suitable data, if necessary.***
4) ***All questions are compulsory.***

***Q1)*** Attempt all : **[8 × 2 = 16]**

a) Define space complercity and time complercity.

b) Give control abstraction for Divide and conquer algorithm.

c) Define feasible solution and optimal solution.

d) State difference between greedy and dynamic method.

e) What is implicit and explicit constraints?

f) What is LIFO in Branch and Bound?

g) Define live node and dead node.

h) Define P and NP class.

***Q2)*** Attempt <u>any four</u>: **[4 × 5 = 20]**

a) Write algorithm for Insertion sort. What is its time complercity?

b) Solve the following fractional knapsack instance using greedy method.

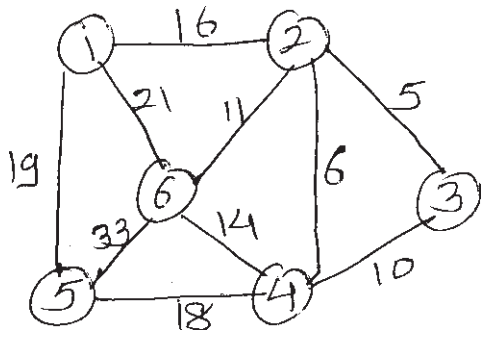
$n = 7, C = 15, \quad (p_1, p_2 \text{ ------ } p_7) = (4, 12, 3, 5, 8, 18, 12)$

$(w_1, w_2 \text{ ------ } w_7) = (3, 4, 6, 5, 4, 1, 7)$

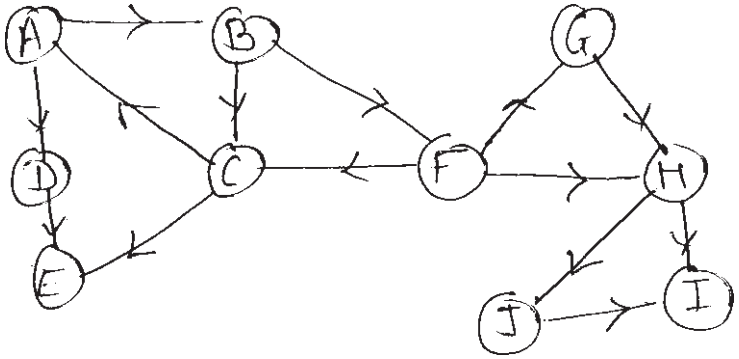
c) Explain 8-Queen's problem.

***P.T.O.***

d) Apply Dijkstra's Algorithm on the following graph.




e) Apply DFS on the following graph. Show all steps




Starting node is A and neighbours are examined in reverse alphabetical order.

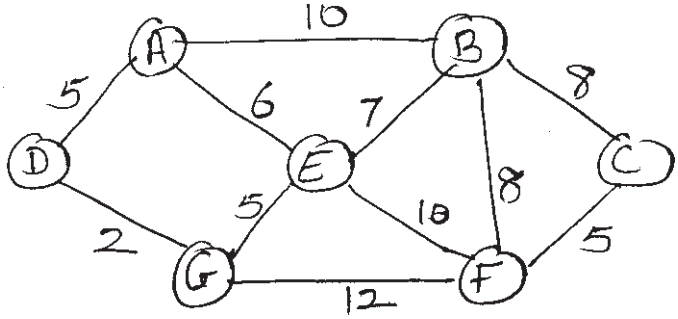
***Q3)*** Attempt <u>any four</u> of the following : **[4 × 8 = 32]**

a) Write an recursive algorithm for binary search obtain and solve its recurrence relation.

b) Let X = aababbaba, Y = baa baa b. Find minimum cost edit sequence that transforms X into Y.

c) What is sum of subset problem? Apply Backtracking to solve the following instance of sum of subsets problem.
m = 12 and w = (1, 4, 5, 7, 8, 11).

d) What do you mean by minimum spanning tree? Obtain the same using prim's and kruskal's algorithm respectively for the following graph.



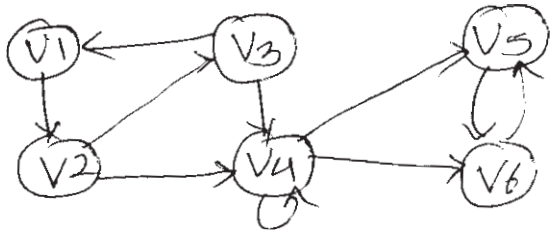
e) apply algorithm for all pairs shortest path problem on the following graph instance.

$$\begin{bmatrix} 0 & 15 & 10 & 2 \\ 8 & 0 & 9 & 7 \\ 12 & 2 & 0 & 15 \\ 2 & 7 & 8 & 0 \end{bmatrix}$$

***Q4)*** Attempt <u>any three</u> : **[3 × 4 = 12]**

a) Explain Graph colouring problem. Give explicit and implicit constraints for m-colouring problem.

b) Apply strongly connected components algorithm on the following graph.




c) Define following terms

i) Articulation point ii) Bridge edge

iii) Biconnected graph iv) Biconnected component

d) Obtain reduced cost matrix from the following traveling salesperson instance.

$$\begin{bmatrix} \infty & 5 & 9 & 10 \\ 6 & \infty & 4 & 8 \\ 3 & 6 & \infty & 9 \\ 14 & 18 & 11 & \infty \end{bmatrix}$$

show how reduced cost matrix is generated for the child node in a tree.

e) Solve the following recurrence relation

$$T(n) = \begin{cases} a & \text{if} \quad n <= 1 \\ 3T(n/3),+cn, & \text{otherwise.} \end{cases}$$

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**Total No. of Questions : 5]** **[Total No. of Pages :2**

**P826**

# [4040] - 302
# M.C.A. II(Under Science Faculty)
# COMPUTER SCIENCE
## CS - 302 : Computer Networks
## (Sem. - III) (2008 Pattern) (New)

***Time : 3 Hours]*** ***[Max. Marks :80***

***Instructions to the candidates:***

1) ***All questions are compulsory.***
2) ***All questions carry equal marks.***
3) ***Figures to the right indicate full marks.***
4) ***Draw neat diagrams wherever necessary.***

***Q1)*** Attempt all of the following : **[8 × 2 =16]**

a) Assume we need to download text documents at the rate of 100 pages per minute, Each page has 24 lines with 80 characters. What is the required bit rate of the channel?

b) Compare Adaptive and Non-Adaptive routing.

c) Define : reservation, polling.

d) Consider four codewords as 00000 00000, 00000 11111, 11111 00000, 11111 11111. How many bits errors we can detect from these codewords? How many bit errors we can correct from these codewords?

e) Draw state transition diagram of RZ and Manchestor encoding for bit string 1010 1100.

f) Draw TCP/IP protocol suite.

g) Draw and explain any two topologies.

h) Consider a noiseless channel with a bandwidth of 3000 Hz transmitting a signal with two levels? What will be the maximum data rate?

***Q2)*** Attempt any four of the following : **[4 × 4 = 16]**

a) Define : Protocol, Defacto standard, Dejure standard, broadcasting.

b) Draw and explain OSI reference model.

c) Define : bit rate, bit length, attenuation, Jitter.

d) How CSMA/CD works? Why it is better than CSMA?

e) Compare FDMA and CDMA.

***P.T.O.***

***Q3)*** Attempt any four of the following : **[4 × 4 = 16]**

a) What is the minimum length of the frame in Ethernet? Why minimum length for frame is defined in Ethernet?

b) Compare virtual circuit and Datagram.

c) Explain IPVG addressing structure.

d) Show values of fragment offset, flags, total length and Identification for each fragment, if original datagram of size 4000 bytes is divided into three fragments of size 1400 bytes?

e) What are the design issues of the layers?

***Q4)*** Attempt any four of the following : **[4 × 4 = 16]**

a) Explain Go-Back N protocol.

b) Explain VLANs.

c) What are the properties of routing algorithms?

d) The receiver receives bit string 11010110111000; if the generator polynomial is 10011. Apply CRC method and see whether received bit string is correct or not?

e) What are the goals of computer network?

***Q5)*** Attempt any four of the following : **[4 × 4 = 16]**

a) What congestion prevention policies can be implemented at each layer?

b) Explain character count and bit stuffing method.

c) "Computer networks are usually packet switched and occasionally circuit switched but never message switched". Why?

d) Compare copper wire and fiber optics.

e) What factor affects the performance of the network?

✪✡✪✡

**Total No. of Questions : 5]** **[Total No. of Pages :3**

**P827**

# [4040] - 303
# M.C.A. II(Under Science Faculty)
# COMPUTER SCIENCE
## CS - 303 : Introduction to System Programming and Operating System Concepts
## (Sem. - III) (New) (2008 Pattern)

***Time : 3 Hours]*** ***[Max. Marks :80***

***Instructions to the candidates:***

1) ***All questions are compulsory.***
2) ***All questions carry equal marks.***
3) ***Figures to the right indicate full marks.***
4) ***Draw neat diagrams wherever necessary.***

***Q1)*** Attempt all of the following : **[8 × 2 =16]**

a) What is a turnaround time?

b) What is a virtual memory?

c) What is a semaphore?

d) What is a system call?

e) Explain linked allocation method in file system.

f) What is spooling?

g) What are compile-time load-time & execution-time binding?

h) What is multithreading?

***Q2)*** Attempt any four of the following : **[4 × 4 = 16]**

a) Explain what is process scheduling? Discuss type of schedulars?

b) Explain with suitable example what is SJF scheduling?

c) Explain physical file and logical file system.

d) Consider the following reference string 7 0 1 2 0 3 0 4 2 3 0 3 2 1 2 0 1 7 0 1 How many page faults would occur for following algorithm with 3 page frames?

i) Optimal ii) FIFO

e) What is segmentation?

***P.T.O.***

*Q3)* Attempt any four of the following : **[4 × 4 = 16]**

a) Explain PCB with suitable diagram.

b) Consider the following segment table.

| Segment | Base | Length |
|---|---|---|
| 0 | 219 | 600 |
| 1 | 2300 | 14 |
| 2 | 90 | 100 |
| 3 | 1327 | 580 |
| 4 | 1952 | 96 |

What are the physical addresses for the following logical addresses.

| | s | d |
|---|---|---|
| i) | 0 | 430 |
| ii) | 1 | 10 |
| iii) | 2 | 500 |
| iv) | 3 | 400 |
| v) | 4 | 112 |

c) Explain contiguous memory allocation method.

d) Explain the term

i) Dynamic loading

ii) Overlay.

e) Explain the following UNIX commands.

i) man ii) lpr

iii) cat iv) who

*Q4)* Attempt any four of the following : **[4 × 4 = 16]**

a) What is deadlock? Give various ways by which one can recover from deadlock.

b) Define following terms :

i) Dispatcher

ii) Pre-emptive scheduling

iii) Aging

iv) Hard Real Time System

c) Explain first-fit, Best-fit & worst-fit memory allocation technique.

d) Explain optimal page Replacement algorithm.

e) Let head of a moving disk with 200 tracks numbered from 0 to 199 is currently at 53. Consider the queue of requests as follows :

100, 98, 183, 37, 122, 14, 124, 65 consider the direction of head movement is towards '0'. Find the total head movement using SCAN & C-look disk scheduling algorithm.

***Q5)*** Attempt <u>any four</u> of the following : **[4 × 4 = 16]**

a) What is P-thread and Java Thread?

b) Write a short note on Demand Paging.

c) Explain multiprocessor system.

d) Consider a system with 5 processes $P_0$ thr' $P_4$ & three resource types A, B, C. Resource type 'A' has 10 instances, B has 5 and 'C' has 7 instances. Suppose at time $T_o$, the system status is as follows :

| | Allocation | Max | Available |
|---|---|---|---|
| | ABC | ABC | ABC |
| $P_0$ | 010 | 753 | 332 |
| $P_1$ | 200 | 322 | |
| $P_2$ | 302 | 902 | |
| $P_3$ | 211 | 222 | |
| $P_4$ | 002 | 433 | |

Answer the following questions using Banker's algorithm.

i) What is the content of the matrix Need?

ii) Is the system in a safe state?

e) Define

i) System program

ii) Multi-level queues.

**Total No. of Questions : 5]** **[Total No. of Pages :3**

**P828**

# [4040] - 304

## M.C.A. (Science Faculty)

### CS - 305 : Event Driven Programming (Win 32 SDK)

### (Sem. - III) (New Course) (2008 Pattern)

***Time : 3 Hours]*** ***[Max. Marks :80***

***Instructions to the candidates:***

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right indicate full marks.***
3) ***Assume suitable data, if necessary.***
4) ***All questions are compulsory.***

***Q1)*** Write a complete Win 32 SDK Program that is menu driven having following menu items and supporting given functionality. (WinMain is not required. Use ODBC APIs) List - displays in a list box on the client area, names of all employees in the table
"Tbl Emp" in DSN "INFO".
Count-displays in Message Box, Number of employees in the table "Tbl Emp".
Accept-Opens a dialog box to accept info (name, job-description, age). The record is inserted in the table "Tbl Emp" when ok button on dialog box is clicked. **[12]**

***Q2)*** Write program statements using Win 32 APIs for any four of the following : (WinMain not required). **[4 × 5 = 20]**

a) Two buttons 'left' and 'right' appear on the window. The status bar is divided into two parts. In left part, the number of times 'left' button pressed is displayed and in the right part, number of times 'right' button pressed is displayed.

b) The system menu of the application window should have two additional menu items called "add" and "restore" separated by a separator bar. The "restore" when clicked, should restore the original system menu, and "add" when clicked, should display the message "menu items successfully added" after adding menu items to system menu.

c) When menu item DRAW is clicked, two threads should start execution, one adding random size rectangles to the window with random color and other counting the number of rectangles, & displaying the count in the top left corner of the client area.

***P.T.O.***

d) The window has a menu item "change" which when clicked, the client contents change from 26 integers displayed in rows and columns to 26 alphabets and vice versa.

e) The windows caption bar shows "I have the Focus" when window gets the input focus and shows "I lost the Focus" when window loses the focus.

***Q3)*** Answer in brief any eight : **[8 × 2 = 16]**

a) What documentation is necessary for a DDE server program?

b) What function should be called when a WM-DESTROY message is received from windows? What message does that API generates?

c) What messages will be received by window application if user presses ALT + A?

d) What is hot spot? What is Caret?

e) Why window is registered in WinMain?

f) What is system registry? How can it be modified?

g) What is a clipboard viewer?

h) What do you mean by handle?

i) What is the difference between sending a message and posting a message?

j) What is the significance of second parameter of WinMain in 16-bit Windows? 32-bit Windows?

***Q4)*** Justify True/False (any six) : **[6 × 2 = 12]**

a) The messages not processed by dialog box procedure are passed on to Def Window Proc.

b) DLLs are always dynamically linked.

c) An invalid rectangle is the area on the screen which is not part of any window.

d) Predefined controls send WM-NOTIFY message while common controls send WM-COMMAND message to their parents.

e) Whenever mouse is moved across the client area, WM-PAINT message is passed to the application.

f) An MDI application is always multi-threaded.

g) If a key is held down, a single WM-KEYDOWN and a single WM-KEYUP message is sent to the program.

h) PeekMessge function returns false when WM-QUIT message is received.

***Q5)*** Attempt <u>any four</u> : **[4 × 5 = 20]**

a) How to obtain average width and height of characters in system font?

b) Discuss any two synchronization objects giving API functions associated with them.

c) What messages are exchanged between a client and server in case of cold link dynamic data exchange and how hot link differs from cold link?

d) What are the contents of wparam and lParam for keyboard messages?

e) Explain different methods to obtain timer.

**Total No. of Questions : 5]** **[Total No. of Pages :2**

**P829**

# [4040] - 501

## M.C.A. III (Under Science Faculty)

### CS - 501 : Cryptography and Network Security

### (Sem. - V) (New) (Pattern 2008)

***Time : 3 Hours]*** ***[Max. Marks :80***

***Instructions to the candidates:***

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***All questions carry equal marks.***

***Q1)*** Attempt all of the following : **[8 × 2 =16]**

a) Define: Interior Router and Exterior Router

b) List the contents of Digital Certificates.

c) Consider the following Plain Text

"UNIVERSITY OF PUNE MEANS BEST EDUCATION"

The key to encrypt the text is an alphabet 4 places down the line. Using Caeser Cipher construct Cipher text.

d) Explain the working of Biometrics.

e) What is Firewall? What are its benefits?

f) Compare Packet Filer and Application Level Gateways.

g) How CA signs the Digital Certificate?

h) Explain LRC in Message Digest.

***Q2)*** Attempt <u>any four</u> of the following : **[4 × 4 = 16]**

a) Write short note on

i) Active Attacks

ii) Passive Attacks

b) Attempt the following

i) Comment: Stream Cipher involves the encryption of one plain text byte by byte.

ii) Comment: Block Cipher technique involves encryption of one block of text at a time.

c) Explain in brief principle of security.

d) How subkey is generated n RC5?

e) Write a short note on Digital signature.

***P.T.O.***

*Q3)* Attempt any four of the following: **[4 × 4 = 16]**

a) Explain in brief the process of one round in DES.

b) Write the BlowFish algorithm. What are the objects of Blowfish?

c) Explain with appropriate example working of Diffie-Hellman key exchange algorithm.

d) Write a short note on SHA.

e) What is key wrapping? How it is useful?

*Q4)* Attempt any four of the following : **[4 × 4 = 16]**

a) What are the different algorithm modes? Explain in brief.

b) Write a short note on Ticket Granting Server.

c) Explain Screen Host architecture.

d) What is the need of PGP (Pretty Good Privacy) ?

e) What is Secure Hypertext transfer protocol ( SHTTP)? How it is different from SSL?

*Q5)* Attempt any four of the following : **[4 × 4 = 16]**

a) Consider the plain text.

"BAT"

Using Hill Cipher construct the cipher text. Let the key matrix be

$$\begin{bmatrix} 6 & 24 & 1 \\ 13 & 16 & 10 \\ 20 & 17 & 15 \end{bmatrix}$$

b) Consider the plain text

"EXAMINATION SECT"

One time pad is QACDZMOUXGIJNVB

Using Vernam Cipher construct the cipher text.

c) Apply PlayFair technique and convert the following plain text into cipher text. Plain text: UNIVERSITY OF PUNE

d) Consider the values of n = 7 and g = 17. Apply Diffie-Hellman Algorithm and generate keys $K_1$ and $K_2$.

e) Consider the plain text "10". Let P = 7 and Q = 11. Construct the cipher text using RSA algorithm and also decrypt the cipher text you have constructed to get the original plain text.

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**Total No. of Questions : 5]** **[Total No. of Pages :2**

**P829**

# [4040] - 501

# M.C.A. III (Under Science Faculty)

## CS - 501 : Mobile Computing

## (Sem. - V) (Old) (2005 Pattern)

***Time : 3 Hours]*** ***[Max. Marks :80***

***Instructions to the candidates:***

1) ***All questions are compulsory.***
2) ***All questions carry equal marks.***

***Q1)*** Attempt any four of the following : **[4 × 4 = 16]**

a) What is path loss of radio signals?

b) What is multiplexing? Explain space division multiplexing.

c) Discuss the radio subsystem of GSM.

d) Explain I-TCP with its advantages & disadvantages.

e) Why base band signal cannot be transmitted in a wireless transmission system?

***Q2)*** Attempt any four of the following : **[4 × 4 = 16]**

a) Discuss the different components of WAP architecture.

b) Explain wireless transaction protocol.

c) Why modulation is needed? which modulation is better for noise immunity & why?

d) Discuss GPRS systems reference model.

e) What are the requirements of mobile IP.

***Q3)*** Attempt any four of the following : **[4 × 4 = 16]**

a) Discuss the registration process of mobile node.

b) What is transaction oriented TCP?

c) Explain wireless datagram protocol.

d) Explain the general features needed for content exchange of WSP.

e) What is exposed terminal problem? How to solve it?

***P.T.O.***

***Q4)*** Attempt any four of the following : **[4 × 4 = 16]**

a) What is handover? Explain all handover scenarios in GSM.

b) Explain mobile terminated call.

c) What is short term & long term fading?

d) Discuss the advantages & disadvantages of mobile systems.

e) Explain demand assigned multiple access method.

***Q5)*** Attempt any four of the following : **[4 × 4 = 16]**

a) Explain bearer & tele services of GSM.

b) What is encapsulation? Explain Generic routing encapsulation.

c) Explain destination sequence distance vector routing.

d) What is reverse tunneling?

e) What is mobile TCP? Explain its advantages.

**Total No. of Questions : 5]** **[Total No. of Pages :2**

**P830**

# [4040] - 502

## M.C.A. (Under Science Faculty)

### CS - 502 : INTERNET PROGRAMMING USING PHP

### (Sem. - V) (2008 Pattern) (New Syllabus)

***Time : 3 Hours]*** ***[Max. Marks :80***

***Instructions to the candidates:***

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***All questions carry equal marks.***

***Q1)*** Attempt all : **[8 × 2 = 16]**

a) Give any two primary uses of PHP.

b) State the use of var-dump( ) f$^{n}$ in PHP.

c) Give the difference between array-splice & array-slice function.

d) What is JSON?

e) What is variable Interpolation?

f) What is the difference between 'Type Juggling' and 'Type Casting'?

g) What is file upload? Give the maximum size of file that can be uploaded using PHP.

h) What is the difference between 'include' and 'require'?

***Q2)*** Attempt <u>any four</u> of the following: **[4 × 4 = 16]**

a) Describe string decomposing f$^{h}$s with suitable example.

b) Explain any four features of PHP.

c) What is serialization? Explain it with different built in functions.

d) What are the differences between GET and POST methods?

e) Write a PHP script to accept 3 numbers and find maximum of these using self-processing form.

***Q3)*** Attempt <u>any four</u> of the following : **[4 × 4 = 16]**

a) Explain any four sort functions of array.

b) Write an anonymous function to concatenate two strings.

c) Explain array global variables.

d) Explain Alert box of Javascript.

e) Write a Php script to accept filename from the user & print total number of words in it.

***P.T.O.***

***Q4)*** Attempt any four of the following : **[4 × 4 = 16]**

a) Explain various stylesheets used in XML.

b) States the types of parsers supported by PHP. Explain XML DOM parser in detail.

c) Create a form to accept employee details like name, address & mobile-no. Once the employee information is accepted then accept LIC information like policy-no, name, premium. Display employee detail & LIC detail on the next form.

(Use Cookie)

d) Explain variable scope in function.

e) State the foll, functions with example.

i) Strstr ( )

ii) Strpos ( )

iii) Shuffle ( )

iv) Str_replace ( )

f) What is an iterator? What are the different iterator functions provided by php?

***Q5)*** Attempt any four of the following : **[4 × 4 = 16]**

a) Explain different types of regular expressions supported by PHP.

b) How to send an email from a PHP script?

c) Write a PHP script to accept directory name from the user and display all files in it with their size in tabular format.

d) How to carry data from page to page? Explain.

e) Consider the following relational database

Student (seat-no, sname)

Subject (sub-no, subname)

Student and subject are related with many to many relation with descriptive attribute 'marks'. Write a PHP script to accept seat-no from the user and print percentage of marks student has achieved.

f) Write a PHP script to create class 'shape' and it's subclasses 'triangle', 'square' and 'circle', to display area of selected shape.

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**Total No. of Questions : 5]** **[Total No. of Pages :2**

**P830**

# [4040] - 502
# M.C.A. III (Under Science Faculty)
# COMPUTER SCIENCE
## CS - 502 : Expert System
## (Sem. - V) (Old) (2005 Pattern)

***Time : 3 Hours]*** ***[Max. Marks :80***

***Instructions to the candidates:***

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***All questions are compulsory.***
3) ***Figures to the right indicate full marks.***

***Q1)*** Attempt any four of the following : **[4 × 4 = 16]**

a) What is an Expert System? Describe the various components of Expert System.

b) Why it is important that Expert System be able to explain the why and how questions regarding a problem solving session?

c) Write a note on Rule-based system architecture.

d) Explain the different types of problems solved by MYCIN Expert System.

e) Write a note on Personal Consultant Plus.

***Q2)*** Attempt any four of the following : **[4 × 4 = 16]**

a) What do you mean by knowledge base? Give any example for showing facts and rules in a simple knowledge base.

b) Differentiate between an efficiency and an efficacy.

c) Define with example following terms

   i) Memorization

   ii) Direct Instruction

d) Describe the following terms.

   i) Knowledge acquisition.

   ii) Analogical learning.

e) Describe the difference between induction and deduction give examples of both.

***P.T.O.***

*Q3)* Attempt any four of the following : **[4 × 4 = 16]**

a) What do you mean by mutation? Where it is used?

b) How knowledge acquisition can be made using an Intelligent Editor?

c) Describe a perception model.

d) Differentiate between learning automata and genetic algorithms.

e) Describe learning automata's components.

*Q4)* Attempt any two of the following : **[2 × 8 = 16]**

a) i) Define induction and various forms of induction.

ii) Explain the concept an Inductive Learning.

b) i) Describe the rules for accomplishing generalization in details.

ii) Justify "Generalization and specialization techniques plays important role in inductive learning.

c) Use the following training Examples to simulate learning the concept "green flower or skinny object".

(green tall fat flower +)
(skinny green short flower +)
(tall skinny green flower +)
(red skinny short weed +)
(green short fat weed –)
(tall green flower skinny +)

*Q5)* Attempt any two of the following : **[2 × 8 = 16]**

a) Write a detail note on connectionist and symbolic approach to Artificial Intelligence.

b) Write a short note on

i) Back propagation.

ii) Boltzmann machine.

c) Whether inductive learning requires more inference than analogical learning. Give reasons which of the two types of learning, in general would be more reliable in the sense that the knowledge learned is logically valid.

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**Total No. of Questions : 5]** **[Total No. of Pages :2**

**P831**

# [4040] - 503
# M.C.A. III (Under Science Faculty)
## COMPUTER SCIENCE
## CS - 503 : Design Pattern
## (Sem. - V) (2008 Pattern) (New)

***Time : 3 Hours]*** ***[Max. Marks :80***

***Instructions to the candidates:***

1) ***All questions are compulsory.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***

***Q1)*** Attempt the following : **[8 × 2 =16]**

a) What is pipe and filter architectural pattern?

b) What are the elements of design pattern?

c) State the intent of BlackBoard architectural pattern.

d) What is the intent of Adapter design pattern?

e) State the participants of command design pattern.

f) State the benefits of singletone design pattern.

g) "Style guides that contains collected idioms work better" Justify.

h) What is an Idiom?

***Q2)*** Attempt <u>any four</u> of the following : **[4 × 4 = 16]**

a) What makes pattern? What are the pattern categories?

b) Explain stepwise refinement approach for layered architectural pattern.

c) Explain the steps to implement Broker architectural pattern.

d) What are the benefits of Blackboard architectural pattern.

e) Explain the structure and consequances of model view controller architectural pattern.

***P.T.O.***

*Q3)* Attempt any four of the following : **[4 × 4 = 16]**

a) Discuss the different criterions or organizing the catalog in design pattern.

b) Explain the structure and participants of Abstract factory design pattern.

c) Give the intent and benefits of Abstract factory design pattern.

d) Explain the structure and participants of prototype design pattern.

e) Explain the consequances of singletone design pattern.

*Q4)* Attempt any four of the following : **[4 × 4 = 16]**

a) Give the structure of class and object of Adapter design pattern.

b) Explain the intent, structure and participants of Decorator Design pattern.

c) Describe the structure and consequances of proxy design pattern.

d) Explain the benefits of Adapter design pattern.

e) Explain the structure and participants of observer design pattern.

*Q5)* Attempt any four of the following : **[4 × 4 = 16]**

a) Explain the command design pattern with the help of structure and consequences.

b) Give the participants and collaboration of observer design pattern.

c) How to implement strategy design pattern?

d) Write a note on counted pointer Idiom.

e) Explain Indented control flow style guide Idioms.

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**Total No. of Questions : 5]** **[Total No. of Pages :2**

**P831**

# [4040] - 503
# M.C.A. III (Science Faculty)
## CS - 503 : Software Project Management
## (Sem. - V) (Old)

***Time : 3 Hours]*** ***[Max. Marks :80***

***Instructions to the candidates:***

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***

***Q1)*** Attempt any four of the following : **[4 × 4 = 16]**

a) Suggest a five-part commonsense approach to software projects.

b) Define software architecture. Why it is important?

c) State the principles of software engineering.

d) What is Quality Assurance? Explain the activities performed by the quality assurance group.

e) Describe technical & non technical factors which affects system maintenance costs.

***Q2)*** Attempt any four of the following : **[4 × 4 = 16]**

a) Define different criteria that enables us to evaluate a design method with respect to its ability to define an effective modular system.

b) Give reasons why algorithmic cost estimates prepared in different organizations are not directly comparable.

c) Explain why it is necessary to design the system architecture before the specifications are written.

d) In real time requirements, it is best to avoid decomposing a system into many small process comment.

e) Explain Risk reduction.

***P.T.O.***

***Q3)*** Attempt any four of the following : **[4 × 4 = 16]**

a) Why maintenance staff are often relatively inexperienced and unfamiliar with the application domain?

b) What are the different basic principles that guide software testing?

c) Explain call and return architectures.

d) What are different objectives of software quality manager?

e) Distinguish between a random & synchronous paradigm for software engineering team.

***Q4)*** Attempt any four of the following : **[4 × 4 = 16]**

a) Comment on "project planning is probably the activity that takes most management time".

b) Describe the difference between risk component and risk drives.

c) What is configuration management? Explain configuration managements tools.

d) Explain various user interface design issues.

e) What is static analysis? Explain.

***Q5)*** Write short notes on the following (any four) : **[4 × 4 = 16]**

a) Structure chart.

b) Design techniques.

c) Object oriented analysis model.

d) User interface prototyping.

e) Regression Testing.

Total No. of Questions : 5] [Total No. of Pages :2

**P832**

# [4040] - 504
# M.C.A. III (Science Faculty)
# COMPUTER SCIENCE
## CS - 505 : Software Testing & Quality Assurance
## (Sem. - V) (2008 Pattern) (New)

*Time : 3 Hours]* *[Max. Marks :80*

***Instructions to the candidates:***

1) ***All questions are compulsory.***
2) ***All questions carry equal marks.***
3) ***Figures to the right indicate full marks.***

***Q1)*** Attempt all of the following : **[8 × 2 = 16]**

a) Explain the use of cause-effect diagram.

b) Explain nature of errors.

c) Define alpha testing.

d) Explain software reviews.

e) Define the term "Measures".

f) What is Pareto Principle?

g) What is Real-time system testing?

h) Explain Acceptance Testing.

***Q2)*** Attempt any four of the following : **[4 × 4 = 16]**

a) Explain Run Charts.

b) What are the activities of Smoke Testing?

c) Explain six-sigma Quality in detail.

d) What are testing characteristics?

e) Explain sampling theory & distribution.

***P.T.O.***

***Q3)*** Attempt any four of the following : **[4 × 4 = 16]**

a) What are the steps to design test cases?

b) Explain Complexity Metrics.

c) Draw cause-effect diagram for House paint peeling.

d) Explain cost of Quality in detail.

e) What is SQA plan?

***Q4)*** Attempt any four of the following : **[4 × 4 = 16]**

a) What type of tests are conducted for client-server system?

b) Explain system testing in detail.

c) Explain sub-activities of Software Quality Assurance.

d) What is Quality Movement?

e) Explain Brainstorming in Pareto analysis.

***Q5)*** Attempt any four of the following write short note on : **[4 × 4 = 16]**

a) Function Oriented Metrics.

b) SQA tasks.

c) ISO 9001 quality standards.

d) Apache Jmeter.

e) Software safety.

**Total No. of Questions : 5]** **[Total No. of Pages :2**

**P833**

# [4040] - 505
# M.C.A. - III (Science Faculty)
# COMPUTER SCIENCE
## CS - 504 :Advanced Modeling Techniques
## (Sem. - V) (Old) (2005 Pattern)

***Time : 3 Hours]*** ***[Max. Marks :80***

***Instructions to the candidates:***

1) ***All questions are compulsory.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***

***Q1)*** Case Study **[16]**

Consider a 'PLACEMENT AGENCY' which helps the candidates to get suitable jobs depending on various factors such as qualification, experience and other skills (computer, marketing, etc.). If the candidate gets selected in the company he has to pay 20% amount of his first months salary to the agency. Model the system using UML techniques and draw the following diagrams.

a) Use case diagram

b) Class diagram

c) Sequence diagram

d) Collaboration diagram

***Q2)*** Attempt any <u>two</u> : **[2 × 4 = 8]**

a) Discuss the advantages of using UML.

b) Discuss the importance of System Design.

c) Explain Inheritance & overriding of functions.

***Q3)*** Attempt any <u>three</u> : **[3 × 4 = 12]**

a) Discuss the different types of classifiers supported by UML.

b) Discuss the different components of activity diagram.

c) Discuss the essential characteristics of a model.

d) Write a short note on object modeling.

***P.T.O.***

***Q4)*** State whether true or false. Justify (any six) : **[6 × 2 = 12]**

a) Aggregations are transitive.

b) Qualifiers reduce multiplicity.

c) Objects may respond differently for the occurrence of same event.

d) Associations are implemented as pointers.

e) Meta class instances are object classes.

f) Processes generate data

g) An abstract class is a class that can have direct instances.

***Q5)*** Attempt any four : **[4 × 8 = 32]**

a) Prepare a class diagram giving attributes and operations and object diagram for both stack and queue implemented using linked list.

b) Prepare class diagram giving attributes & operations for the dining philosopher's problem. There are 5 philosophers and 5 forks around a circular table. Each philosopher has access to 2 forks on either side. Each fork is shared by 2 philosophers. Each fork may be either on table or in use by one philosopher. A philosopher must have 2 forks to eat. A philosopher may eat, think or talk to one of his neighbours.

c) Consider an Automatic Water Level control system, which is used for controlling the water flow. Identify the different states & draw a state transition diagram.

d) Draw a DFD, for 'MCA centralized admission system'. A student fills the form giving his details such as name, subj., mks, entrance mks category etc. A merit list is generated. The system provides the details such as list of colleges, No. of seats per college etc.

e) Draw a component & Deployment diagram for 'ATM Banking system'.