1. The Greek Ambassador Megasthenese came to India during the time of which of the following Mauryan kings?

   (a) Chandragupta

   (b) Chandragupta Vikramaditya

   (c) Ashoka

   (d) Samudragupta

2. In the Ganga valley rainfall decreases from

   (a) West to east and north to south

   (b) West to east and south to north

   (c) East to west and north to south

   (d) East to west and south to north

3. Who introduced the Permanent Settlement of 1793?

   (a) Robert Clive

   (b) Cornwallis

   (c) John Shore

   (d) Philip Francis

4. Sir Thomas Roe came to the court of which of the following Mughal emperors?

   (a) Babur

   (b) Humayun

   (c) Akbar

   (d) Jahangir

5. Humidity in the air is measured by:

   (a) Hydrometer

   (b) Hygrometer

   (c) Opisometer

   (d) Barometer

6. Washing soda is:

   (a) Sodium chloride

   (b) Sodium bicarbonate

   (c) Sodium carbonate

   (d) Sodium silicate

7. The Battle of Plassey was fought between:

   (a) English East India Company and the Nawab of Bengal

   (b) The British and the Marathas

   (c) Rajputs and Mughals

   (d) Mughals and Afghans

8. All atoms in a column of the periodic table have:

   (a) The same number of protons

   (b) The same number of electrons in the outer energy level

   (c) The same abbreviation

   (d) The same number of energy levels

9. Arrange the layers of the atmosphere in order of increasing altitude:

   (a) Troposphere, stratosphere, mesosphere, thermosphere

   (b) Mesosphere, stratosphere, thermosphere, troposphere

   (c) Troposphere, stratosphere, thermosphere, mesosphere

   (d) Thermosphere, mesosphere, stratosphere, troposphere

10. Which of the following is **not** a kharif crop?

   (a) Paddy

   (b) Maize

   (c) Gram

   (d) Millet

11. Which one of the following describes India as a secular state?

   (a) Fundamental Rights

   (b) Directive Principles of State Policy

   (c) Preamble of the Constitution

   (d) Fifth Schedule

12. Which Constitutional Amendment Act deals with Panchayati Raj Institutions in India?

   (a) Twenty Fifth Amendment Act

   (b) Thirty FourthAmendment Act

   (c) Seventy Third Amendment Act

   (d) Seventy Fourth Amendment Act

13. Which among the following is not a source of government's tax revenue?

(a) Income tax

(b) Stamp duties

(c) Import duties

(d) Dividends from public sector enterprises

14. Why is red light employed for danger signals?

(a) Red colour is soothing to the eye

(b) Human eye is most sensitive to red colour

(c) Red light is scattered least

(d) Red light is scattered most

15. Which word completes the sentence: Water ---------- when it freezes.

(a) Expands

(b) Contracts

(c) Dissolves

(d) Conducts

16. The phenomenon of splitting of a beam of white light into its seven constituent colours is:

(a) Reflection of light

(b) Refraction of light

(c) Dispersion of light

(d) Interference of light

17. Who is the author of *Ain-i-Akbari*?

(a) Akbar

(b) AbulFazl

(c) Firdausi

(d) Todarmal

18. Who is the supreme commander of the Armed Forces of India?

(a) President

(b) Prime Minister

(c) Defence Minister

(d) Chief Justice of Supreme Court

19. Millennium Development Goals have been set up for:

(a) All Countries

(b) Developed Countries

(c) Developing Countries

(d) OECD Countries

20. Which event marked the beginning of the Civil Disobedience Movement in 1930?

(a) Dandi March

(b) Non-payment of taxes

(c) Boycott of law courts

(d) Boycott of titles

21. Which one of the following is a correct sequence of velocity of sound v_s in glass, iron, air and water:

(a) v_s (glass) >v_s (iron) >v_s (air) >v_s (water)

(b) v_s (air) >v_s (water) >v_s (iron) >v_s (glass)

(c) v_s (glass) >v_s (iron)>v_s (water) >v_s (air)

(d) v_s (iron) >v_s (glass) >v_s (water) >v_s (air)

22. Which district of Punjab has the largest population according to the Census of India 2011?

(a) Jalandhar

(b) Amritsar

(c) Ludhiana

(d) Ferozepur

23. Bi focal lens is used by a person who has :

(a) Astigmatism

(b) Myopia

(c) Hypermetropia

(d) Presbyopia

24. Who among the following was popularly known as 'Punjab Kesari'?

(a) Ranjit Singh

(b) Lala Lajpat Rai

(c) Duleep Singh

(d) Bhagat Singh

25. Capt Amarinder Singh in his present tenure is the _____ Chief Minister of Punjab.

(a) 21st
(b) 26th
(c) 23rd
(d) 29th

26. Given below are the names of Chief Ministers and States. Chose the correct combination:

A	Trivendra Singh	I	Goa
B	N. Biren Singh	II	UP
C	Manohar Parrikar	III	Manipur
D	Yogi Adityanath	IV	Uttarakhand

(a) A-I B-IV C-III D-II
(b) A-IV B-I C-III D-II
(c) A-IV B-III C-I D-II
(d) A-I B-IV C-III D-II

27. The India Ocean Rim Association (IORA) Leaders Summit was held from March 5 to 7, 2017 in:

(a) Jakarta
(b) Bombay
(c) Dhaka
(d) Karachi

28. In the latest world Happiness Report 2017, the country ranking at the top spot is:
(a) Denmark
(b) Finland
(c) Iceland
(d) Norway

29. Consider the following species:
1) Whales 2) Sharks
3) Polar Bears 4) Gazelles
Which of the above species have been recently given protection under the UN Conservation of Migratory Species of Wild Animals (CMS) ?

(a) 1,2 and 3
(b) 2,3 and 4
(c) 3 and 4
(d) 1,2,3 and 4

30. Consider the following statements regarding fisheries production:
1. India is the largest producer of fish in the world
2. India is the second-largest producer of fresh water fish in the world
Which of the statements given above is/are correct?
(a) Only 1
(b) Only 2
(c) Both 1 and 2
(d) Neither 1 nor 2

31. Which of the following is true when describing any cast address?

(a) Packets addressed to a unicast address are delivered to a single interface

(b) Packets are delivered to all interfaces identified by the address. This is also called one-to-many addresses

(c) This address identifies multiple interfaces and the any cast packet is only delivered to one address. This address can also be called one-to-one-of-many

(d) These addresses are meant for non-routing purposes, but they are almost globally unique so it is unlikely they will have an address overlap

32. Consider a join (relation algebra) between relations r(R) and s(S) using the nested loop method. There are 3 buffers each of size equal to disk block size, out of which one buffer is reserved for intermediate results. Assuming size(r(R))<size(s(S)), the join will have fewer number of disk block accesses if:

(a) Relation r(r) is in the outer loop

(b) Relation s(s) is in the outer loop

(c) Join selection factor between r(r) and s(s) is more than 0.5

(d) Join selection factor between r(r) and s(s) is less than 0.5

33. An IP router with a Maximum Transmission Unit (MTU) of 1500 bytes has received an IP packet of size 4404 bytes with an IP header of length 20 bytes. The values of the relevant fields in the header of the third IP fragment generated by the router for this packet are:

(a) Mf bit: 0, datagram length: 1444; offset: 370

(b) Mf bit: 1, datagram length: 1424; offset: 185

(c) Mf bit: 1, datagram length: 1500; offset: 370

(d) Mf bit: 0, datagram length: 1424; offset: 2960

34. A _____ integrity constraint requires that the values appearing in specified attributes of any tuple in the referencing relation also appear in specified attributes of at least one tuple in the referenced relation.

(a) Referential

(b) Referencing

(c) Specific

(d) Primary

35. Give output of the following:

```
#include <iostream>
using namespace std;
class exam
{ private:
int x, y, z;
public:
int testcase( )
{
x=50; y=20; z=30;
```

```
}
friend int add( exam e);
};
int add( exam e)
{
return int( e.x+ e.y+ e.z);
}
int main( )
{
exam a;
a.testcase( );
cout << add(a);
return 0;
}
```

(a) 0
(b) Compile time error
(c) 100
(d) None of these

36. If all tasks must be executed in the same time-span, what type of cohesion is being exhibited?

(a) Procedural Cohesion
(b) Temporal cohesion
(c) Functional cohesion
(d) Sequential cohesion

37. Match the following and select the correct options given under:

i) physical design	a) Documentation
ii) interview	b) Type of output
iii) Input design	c) defines design specifications that are to be coded
iv) Installation procedure	d) a data gathering technique
v) report	e) Identification and design of interfaces to enter data

(a) i-d, ii – a, iii-b, iv – c, v- e

(b) i-c, ii – d, iii-e, iv – a, v- b

(c) i-a, ii – d, iii-b, iv – c, v- e

(d) i-d, ii – a, iii-e, iv – b, v- c

38. Which of the following statements is correct regarding identifying Classes and Objects and drawing a Class diagram and an Object diagram?

(a) Entity and boundary are the only two primary class stereotypes in uml 2.0

(b) An aggregation relationship is discovered in a class diagram when one finds classes in the initial model which have common attributes and operations

(c) Class diagrams show general definitional information about classes whereas an object diagrams are used to model specific instances of classes at specific instants in time

(d) A class is a set of objects which share common attributes and behavior

39. The _____ is a standard for exchanging authentication and authorization information between different security domains, to provide cross-organization single sign-on.
    (a) Openid
    (b) Sign-on system
    (c) Security assertion markup language (saml)
    (d) Virtual private database (vpd)

40. VPD (Virtual Private Database) provides authorization at the level of specific tuples, or rows, of a relation, and is therefore said to be a _____ mechanism.
    (a) Row-level authorization
    (b) Column-level authentication
    (c) Row-type authentication
    (d) Authorization security

41. Which of the following can be addressed by enforcing a referential integrity constraint?
    (a) All phone numbers must include the area code
    (b) Certain fields are required (such as the email address, or phone number) before the record is accepted
    (c) Information on the customer must be known before anything can be sold to that custome
    (d) When entering an order quantity, the user must input a number and not some text (i.e., 12 rather than 'a dozen')

42. In what type of coupling, the complete data structure is passed from one module to another?
    (a) Control coupling
    (b) Stamp coupling
    (c) External coupling
    (d) Content coupling

43. The responsibilities of a system analyst include:
    i) defining and prioritizing information requirement of an organization
    ii) gathering data, facts and opinions of users in an organization
    iii) drawing up specifications of the system for an organization
    iv) designing and evaluating the system
    (a) i and ii
    (b) i, ii and iv
    (c) i, ii, iii and iv
    (d) i, ii and iii

44. A state machine is:

(a) The execution of a particular specified instance

(b) The execution of a particular class of state chart diagram

(c) The execution of a policy by a government behemoth

(d) The execution of a state chart diagram by a specified instance

45. Ip is defined in:

(a) Rfc 790

(b) Rfc 791

(c) Rfc 792

(d) Rfc 793

46. Assume you are creating a database to handle the data associated with instruction at a university. What is the most appropriate special association to model that a course has an assigned instructor, teaching assistants, a classroom, meeting time slot, and class roster?

(a) Aggregation association

(b) Generalization association

(c) N-ary association

(d) Reflexive association

47. A web site that allows users to enter text, such as a comment or a name, and then stores it and later displays it to other users, is potentially vulnerable to a kind of attack called a _____ attack.

(a) Two-factor authentication

(b) Cross-site request forgery

(c) Cross-site scripting

(d) Cross-site scoring scripting

48. The most important and common protocols associated tcp/ip internetwork layer are:
i) Internet Protocol(IP)
ii) Internet Control Message Protocol(ICMP)
iii) Bootstrap Protocol (BOOTP)
iv) Dynamic Host Configuration Protocol (DHCP)
v) Address Resolution Protocol (ARP)

(a) i, ii, iii and iv only

(b) i, iii, iv and v only

(c) ii, iii, iv and v only

(d) All i, ii, iii, iv and v

49. Match the following http status code to their respective definitions:

i) 400	a) ok
ii) 500	b) not found
iii) 200	c) continue
iv) 100	d) internal server error

(a) i-b, ii-d, iii-a, iv-c

(b) i-a, ii-b, iii-c, iv-d

(c) i-b, ii-c, iii-a, iv-d

(d) i-b, ii-a, iii-c, iv-d

50. In multicast routing with spanning tree method, a network with n groups, each with an average of m members, for each group we require ……..

(a) N pruned spanning trees must be stored for a total of mn trees

(b) M pruned spanning trees must be stored for a total of m trees

(c) N pruned spanning trees must be stored for a total of n trees

(d) M pruned spanning trees must be stored for a total of mn trees

51. Host A (on TCP/IP v4 network A) sends an IP datagram D to host B (also on TCP/IP v4 network B). Assume that no error occurred during the transmission of D. When D reaches B, which of the following IP header field(s) may be different from that of the original datagram D?

(i) TTL (ii) Checksum (iii) Fragment Offset

(a) (i) only

(b) (i) and (ii) only

(c) (ii) and (iii) only

(d) (i), (ii) and (iii)

52. Which join refers to join records from the right table that have no matching key in the left table are include in the result set:

(a) Left outer join

(b) Right outer join

(c) Full outer join

(d) Half outer join

53. In SQL the statement select * from R, S is equivalent to:

(a) Select * from R natural join S

(b) Select * from R cross join S

(c) Select * from R union join S

(d) Select * from R inner join S

54. _____ is increasingly being used in server systems to improve performance by caching frequently used data, since it provides faster access than disk, with larger storage capacity than main memory.

(a) Flash memory

(b) Disk

(c) Main memory

(d) Secondary memory

55. Which property of Object Oriented Programming is exhibited by the code:

```
#include< iostream>
class quest
{
public:
float add( float a, float b)
{
cout << “The sum is:”;
reurn(a+b); } }
int add( int a, int b, int c)
{
cout << ”The sum is:”;
return(a+b+c);
}
int add( int a, int b=0)
{
cout << ”The sum is:”;
return(a+b);
}
};
int main( )
{
quest q
q. Add( 50.5, 48.2)
q. Add( 42, 56, 82)
q. Add( 23)
return 0;
}
```

(a) Compile time polymorphism

(b) Run time polymorphism

(c) Both

(d) None of these

56. Read List-I and List-II and Match the following:

a. Data coupling ----------	i. Module A and Module B have shared data
b. Stamp coupling ----------	ii. Dependency between modules is based on the fact they communicate by only passing of data
c. Common coupling --------	iii. When complete data structure is passed from one module to another
d. Content coupling ----------	iv. When the control is passed from one module to the middle of another

(a) a - iii, b - ii, c - i, d - iv

(b) a - ii, b - iii, c - i, d - iv

(c) a - ii, b - iii, c - iv, d - i

(d) a - iii, b - ii, c - iv, d - i

57. Design Phase consists of ……
1. Identity the functions to be performed
2. Design the input/output and file design
3. Defining basic parameters for system design

(a) 1 & 2

(b) 2 & 3

(c) 1 & 3

(d) 1, 2 & 3

58. …….. is a time consuming phase and yet a very crucial phase.

(a) Feasibility study

(b) Requirement phase

(c) Analysis phase

(d) Testing phase

59. In order to understand the working of an organization for which a computer based system is being designed, an analyst must?

(a) Look at only current work and document flow in the organization

(b) Discuss with top level and middle level management only

(c) Interview top, middle, line managers and also clerks who will enter data And use the system

(d) Only clerical and middle level staff who have long experience in the Organization and will be users of the system

60. Which of the following questions are useful in evaluating data flow diagrams?

(a) Are there any unnamed components in the data flow diagram?

(b) Are there any processes that do not receive input?

(c) Are there any data stores that are input but never referenced?

(d) All (a), (b) and (c) above

61. Which UML diagram that has the overall framework of an activity diagram and interaction diagrams as activities?

(a) Composite structure diagram

(b) Interaction overview diagram

(c) Sequence diagram

(d) Activity diagram

62. IPX/SPX used for:

(a) Linux

(b) Unix

(c) Novel Netware

(d) Windows

63. The examples of Interior Gateway Protocols (IGP) are:
i) Open Short Path First (OSPF)
ii) Routing Information Protocol (RIP)
iii) Border Gateway Protocol (BGP)

(a) i only

(b) i, and ii only

(c) i and iii only

(d) All i, ii and iii

64. Enhancements, upgrades, and bug fixes are done during the _____ step in the SDLC.

(a) Maintenance and evaluation

(b) Problem/opportunity identification

(c) Design

(d) Development and documentation

65. In …… circuit switching, delivery of data is delayed because data must be stored and retrieved from RAM.

(a) Space division

(b) Time division

(c) Virtual

(d) None of these

66. Consider a simple check pointing protocol and the following set of operations in the log.

(start, T4); (write, T4, y, 2, 3); (start, T1); (commit, T4); (write, T1, z, 5, 7); (checkpoint); (start, T2); (write, T2, x, 1, 9); (commit, T2); (start, T3); (write, T3, z, 7, 2);

If a crash happens now and the system tries to recover using both undo and redo operations, what are the contents of the undo list and the redo list?

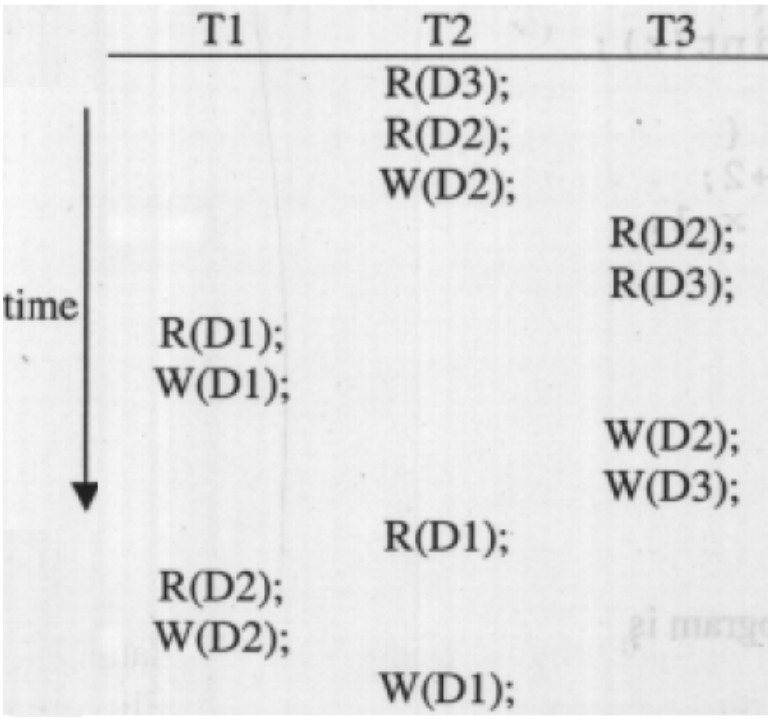
(a) Undo: T3, T1; Redo: T2

(b) Undo: T3, T1; Redo: T2, T4

(c) Undo: none; Redo: T2, T4, T3; T1

(d) Undo: T3, T1, T4; Redo: T2

67. Consider three data items D1, D2 and D3 and the following execution schedule of transactions T1, T2 and T3. In the diagram, R(D) and W(D) denote the actions reading and writing the data item D respectively.



Which of the following statements is correct?

(a) The schedule is serializable as T2; T3; T1

(b) The schedule is serializable as T2; T1; T3

(c) The schedule is serializable as T3; T2; T1

(d) The schedule is not serializable

68. Consider the following partial Schedule S involving two transactions T1 and T2. Only the read and the write operations have been shown. The read operation on data item P is denoted by read(P) and the write operation on data item P is denoted by write(P).

Time	Transaction-id	
	$T1$	$T2$
1	*read*(A)	
2	*write*(A)	
3		*read*(C)
4		*write*(C)
5		*read*(B)
6		*write*(B)
7		*read*(A)
8		*commit*
9	*read*(B)	

Suppose that the transaction T1 fails immediately after time instance 9. Which one of the following statement is correct?

(a) T2 must be aborted and then both T1 and T2 must be re-started to ensure transaction atomicity

(b) Schedule S is non-recoverable and cannot ensure transaction atomicity

(c) Only T2 must be aborted and then re-started to ensure transaction atomicity

(d) Schedule S is recoverable and can ensure atomicity and nothing else needs to be done

69. Which level of locking provides the highest degree of concurrency in a relational data base?
(a) Page
(b) Table
(c) Row
(d) Page, table and row level locking allow the same degree of concurrency

70. Consider the following database schedule with two transactions, T1 and T2.
S = r2(X); r1(X); r2(Y); w1(X); r1(Y); w2(X); a1; a2;

Where ri(Z) denotes a read operation by transaction Ti on a variable Z, wi(Z) denotes a write operation by Ti on a variable Z and ai denotes an abort by transaction Ti . Which one of the following statements about the above schedule is TRUE?
(a)S is non-recoverable
(b) S is recoverable, but has a cascading abort
(c) S does not have a cascading abort
(d) S is strict

71. Consider the following three schedules of transactions T1, T2 and T3. [Notation: In the following NYO represents the action Y (R for read, W for write) performed by transaction N on object O.]

(S1) 2RA 2WA 3RC 2WB 3WA 3WC 1RA 1RB 1WA 1WB
(S2) 3RC 2RA 2WA 2WB 3WA 1RA 1RB 1WA 1WB 3WC
(S3) 2RZ 3RC 3WA 2WA 2WB 3WC 1RA 1RB 1WA 1WB

Which of the following statements is TRUE?
(a) S1, S2 and S3 are all conflict equivalent to each other
(b) No two of S1, S2 and S3 are conflict equivalent to each other
(c) S2 is conflict equivalent to S3, but not to S1
(d) S1 is conflict equivalent to S2, but not to S3

72. Relation R has eight attributes ABCDEFGH. Fields of R contain only atomic values. F = {CH -> G, A -> BC, B -> CFH, E -> A, F -> EG} is a set of functional dependencies (FDs) so that F+ is exactly the set of FDs that hold for R.
How many candidate keys does the relation R have?

(a) 3
(b) 4
(c) 5
(d) 6

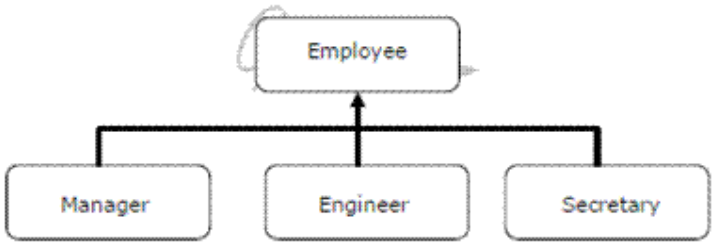
73. Consider the following relational schemes for a library database:
Book (Title, Author, Catalog_no, Publisher, Year, Price)
Collection (Title, Author, Catalog_no) within the following functional dependencies:
i. Title Author --> Catalog_no
ii. Catalog_no --> Title Author Publisher Year
iii. Publisher Title Year --> Price

Assume {Author, Title} is the key for both schemes. Which of the following statements is true?
(a) Both Book and Collection are in BCNF
(b) Both Book and Collection are in 3NF only
(c) Book is in 2NF and Collection is in 3NF
(d) Both Book and Collection are in 2NF only

74. A data flow can:
(a) Only emanate from an external entity
(b) Only terminate in an external entity
(c) May emanate and terminate in an external entity
(d) May either emanate or terminate in an external entity but not both

75. It is desired to design an object-oriented employee record system for a company. Each employee has a name, unique id and salary. Employees belong to different categories and their salary is determined by their category. The functions to get Name, getId and compute salary are required. Given the class hierarchy below, possible locations for these functions are:

i. getId is implemented in the superclass
ii. getId is implemented in the subclass
iii. getName is an abstract function in the superclass
iv. getName is implemented in the superclass
v. getName is implemented in the subclass
vi. getSalary is an abstract function in the superclass
vii. getSalary is implemented in the superclass
viii. getSalary is implemented in the subclass



Choose the best design

(a) (i), (iv), (vi), (viii)
(b) (i), (iv), (vii)
(c) (i), (iii), (v), (vi), (viii)
(d) (ii), (v), (viii)

76. What is the return value of f(p, p) if the value of p is initialized to 5 before the call? Note that the first parameter is passed by reference, whereas the second parameter is passed by value:

```
int f(int &x, int c) {
 c  = c - 1;
 if (c == 0) return 1;
  x = x + 1;
return f(x, c) * x;}
```

(a) 3024
(b) 6561
(c) 55440
(d) 161051

77. Predict the output of following C++ program.

```
#include<iostream>
using namespace std;
int &fun()
{
   static int x = 10;
   return x;
}
int main()
{
   fun() = 30;
   cout << fun();
   return 0;
}
```

(a) Compiler Error: Function cannot be used as lvalue
(b) 10
(c) 30
(d) 0

78. Which of the following overloaded functions are NOT allowed in C++?

1) Function declarations that differ only in the return type
   int fun(int x, int y);
   void fun(int x, int y);
2) Functions that differ only by static keyword in return type
   int fun(int x, int y);
   static int fun(int x, int y);
3) Parameter declarations that differ only in a pointer * versus an array []
   int fun(int *ptr, int n); int fun(int ptr[], int n);
4) Two parameter declarations that differ only in their default arguments
   int fun(int x, int y);
   int fun(int x, int y = 10);

(a) All of the above
(b) All except 2)
(c) All except 1)
(d) All except 2 and 4

79. B+ Trees are considered BALANCED because:

(a) the lengths of the paths from the root to all leaf nodes are all equal
(b) the lengths of the paths from the root to all leaf nodes differ from each other by at most 1
(c) the number of children of any two non-leaf sibling nodes differ by at most 1
(d) the number of records in any two leaf nodes differ by at most 1

80. Determine the maximum length of cable (in km) for transmitting data at a rate of 500 Mbps in an Ethernet LAN with frames of size 10,000 bits. Assume the signal speed in the cable to be 2,00,000 km/s

(a) 1
(b) 2
(c) 2.5
(d) 5

81. Information about a collection of students is given by the relation studinfo (studId, name, sex). The relation enroll (studId, courseId) gives which student has enrolled for (or taken) that course(s). Assume that every course is taken by at least one male and at least one female student. What does the following relational algebra expression represent?

$$\Pi_{\text{courseId}}\left(\left(\Pi_{\text{studId}}\left(\sigma_{sex=\text{"female"}}\left(\text{studInfo}\right)\right)\times\Pi_{\text{courseId}}\left(\text{enroll}\right)\right)-\text{enroll}\right)$$

(a) Courses in which all the female students are enrolled.
(b) Courses in which a proper subset of female students are enrolled.
(c) Courses in which only male students are enrolled.
(d) None of the above

82. Consider the following schedule for transactions T1, T2 and T3:

T1	T2	T3
Read (X)		
	Read (Y)	
		Read (Y)
	Write (Y)	
Write (X)		
		Write (X)
	Read (X)	
	Write (X)	

Which one of the schedules below is the correct serialization of the above?

(a) T1->>T3->>T2

(b) T2->>T1->>T3

(c) T2->>T3->>T1

(d) T3->>T1->>T2

83. Let the size of congestion window of a TCP connection be 32 KB when a timeout occurs. The round trip time of the connection is 100 msec and the maximum segment size used is 2kB. The time taken (in msec) by the TCP connection to get back to 32KB congestion window is _____
(a) 1100 to 1300
(b) 200 to 500
(c) 2000 to 2400
(d) None of the above

84. Which one of the following is TRUE about the interior gateway routing protocols – Routing Information Protocol (RIP) and Open Shortest Path First (OSPF)?
(a) RILP uses distance vector routing and OSPF uses link state routing
(b) OSPF uses distance vector routing and RIP uses link state routing
(c) Both RIP and OSPF use link state routing
(d) Both RIP and OSPF use distance vector routing

85. Which of the following phases identifies and expresses requirements, prioritizes requirements, updates project plan, and communications the requirements statement?
    (a) logical design phase
    (b) decisions analysis phase
    (c) problem analysis phase
    (d) none of the above

86. The tasks of defining acceptance tests, structuring functional requirements, and validating functional requirements are performed in which one of the phases?
    (a) problem analysis phase
    (b) decision analysis phase
    (c) systems analysis phase
    (d) logical design phase

87. Predict the output of following C++ program.

```
#include<iostream>
using namespace std;

class Test
{
private:
 int x;
public:
 Test(int x = 0) { this->x = x; }
 void change(Test *t) { this = t; }
 void print() { cout << "x = " << x << endl; }
};
 int main()
{
 Test obj(5);
 Test *ptr = new Test (10);
 obj.change(ptr);
 obj.print();
 return 0;
}
```

(a) x = 5
(b) x = 10
(c) Compiler Error
(d) Runtime Error

88. Predict the output:

```
#include <iostream>
using namespace std;

int main()
{
   try
   {
     throw 10;
```

```
    }
    catch (...)
    {
      cout << "default exception\n";
    }
    catch (int param)
    {
      cout << "int exception\n";
    }

    return 0;
}
```

(a) default exception
(b) int exception
(c) Compiler Error
(d) Runtime Error

89. The maximum number of super keys for the relation schema R(E,F,G,H) with E as the key is
(a) 5
(b) 6
(c) 7
(d) 8

90. Let r be a relation instance with schema R = (A, B, C, D). We define $r_1 = \Pi_{A, B, C}$ (r) and $r_2 = \Pi_{A,D}$ (r). Let $s = r_1 * r_2$ where * denotes natural join. Given that the decomposition of r into r_1 and r_2 is lossy, which one of the following is TRUE?
(a) $s \subset r$
(b) $r \cup s$
(c) $r \subset s$
(d) $r * s = s$

91. Consider a database table T containing two columns X and Y each of type integer. After the creation of the table, one record (X=1, Y=1) is inserted in the table.

Let MX and My denote the respective maximum values of X and Y among all records in the table at any point in time. Using MX and MY, new records are inserted in the table 128 times with X and Y values being MX+1, 2*MY+1 respectively. It may be noted that each time after the insertion, values of MX and MY change. What will be the output of the following SQL query after the steps mentioned above are carried out?
SELECT Y FROM T WHERE X=7;

(a) 127
(b) 255
(c) 129
(d) 257

92. Database table by name Loan_Records is given below:

Borrower	Bank_Manager	Loan_Amount
Ramesh	Sunderajan	10000.00
Suresh	Ramgopal	5000.00
Mahesh	Sunderajan	7000.00

What is the output of the following SQL query?

```
SELECT Count(*)
FROM  ( (SELECT Borrower, Bank_Manager
      FROM   Loan_Records) AS S
       NATURAL JOIN (SELECT Bank_Manager,
                    Loan_Amount
                FROM   Loan_Records) AS T );
```

(a) 3
(b) 9
(c) 5
(d) 6

93. Output of following program?

```
#include <iostream>
using namespace std;
class Test2
{
   int y;
};

class Test
{
   int x;
   Test2 t2;
public:
   operator Test2 ()  { return t2; }
   operator int () { return x; }
};

void fun ( int x) { cout << "fun(int) called"; }
void fun ( Test2 t ) { cout << "fun(Test 2) called"; }

int main()
{
   Test t;
   fun(t);
   return 0;
}
```

(a) fun(int) called
(b) fun(Test 2) called
(c) Compiler Error: Ambiguous call to fun()
(d) none of the above

94. Predict the output?

```
#include<stdlib.h>
#include<stdio.h>
#include<iostream>
```

```
 using namespace std;

class Test {
   int x;
public:
   void* operator new(size_t size);
   void operator delete(void*);
   Test(int i) {
      x = i;
      cout << "Constructor called \n";
   }
   ~Test() { cout << "Destructor called \n"; }
};

 void* Test::operator new(size_t size)
{
   void *storage = malloc(size);
   cout << "new called \n";
   return storage;
}

void Test::operator delete(void *p )
{
   cout<<"delete called \n";
   free(p);
}

int main()
{
   Test *m = new Test(5);
   delete m;
   return 0;
}
```

(a)
new called
Constructor called
delete called
Destructor called
(b)
new called
Constructor called
Destructor called
delete called
(c)
Constructor called
new called

Destructor called
delete called
(d)
Constructor called
new called
delete called
Destructor called

95. Predict the outout

```
#include <iostream>
using namespace std;
class Test {
 static int count;
 int id;
public:
 Test() {
   count++;
   id = count;
   cout << "Constructing object number " << id << endl;
   if(id == 4)
     throw 4;
 }
 ~Test() { cout << "Destructing object number " << id << endl; }
};
int Test::count = 0;
 int main() {
 try {
   Test array[5];
 } catch(int i) {
   cout << "Caught " << i << endl;
 }
}
```

(a)

```
 Constructing object number 1
Constructing object number 2
Constructing object number 3
Constructing object number 4
Destructing object number 1
Destructing object number 2
Destructing object number 3
Destructing object number 4
Caught 4
```

(b)

```
Constructing object number 1
Constructing object number 2
```

Constructing object number 3
Constructing object number 4
Destructing object number 3
Destructing object number 2
Destructing object number 1
Caught 4

(c)
Constructing object number 1
Constructing object number 2
Constructing object number 3
Constructing object number 4
Destructing object number 4
Destructing object number 3
Destructing object number 2
Destructing object number 1
Caught 4

(d)
Constructing object number 1
Constructing object number 2
Constructing object number 3
Constructing object number 4
Destructing object number 1
Destructing object number 2
Destructing object number 3
Caught 4

96. Consider the following class definitions in a hypothetical Object Oriented language that supports inheritance and uses dynamic binding. The language should not be assumed to be either Java or C++, though the syntax is similar.

```
Class P
{
   void f(int i)
   {
      print(i);
   }
}

Class Q subclass of P
{
   void f(int i)
   {
      print(2*i);
   }
}
```

Now consider the following program fragment:

```
P x = new Q();
Q y = new Q();
P z = new Q();
x.f(1); ((P)y).f(1); z.f(1);
```

Here ((P)y) denotes a typecast of y to P. The output produced by executing the above program fragment will be

(a) 1 2 1
(b) 2 1 1
(c) 2 1 2
(d) 2 2 2

97. Which of the following is not true about B+ trees?

    (a) B+ tree index takes the form of balanced tree

    (b) Performance of B+ tree degrades as the file grows

    (c) Look-up in B+ tree is straightforward and efficient

    (d) Insertion and deletion in B+ tree is complicated but efficient

98. Which attribute(s) make up the primary key in the table definition CLASS (CRS_CODE, CLASS_SECTION, CLASS_TIME, CLASS_ROOM, PROF_NUM)?

    (a) CRS_CODE

    (b) CLASS_SECTION

    (c) CRS_CODE and CLASS_SECTION

    (d) there is no primary key

99. In Message Confidentiality, transmitted message must make sense to only intended:

    (a) Receiver

    (b) Sender

    (c) Third Party

    (d) Translator

100. A hash function guarantees integrity of a message. It guarantees that message has not be:

    (a) Replaced

    (b) Over viewed

    (c) Changed

    (d) Left

****