



VINAYAKA MISSION'S RESEARCH FOUNDATION, SALEM
(Deemed to be University under section 3 of the UGC Act 1956)

Civil Engineering

Instructions / Note:

1. Answer all the questions. Each question carries one mark.
2. No negative marks for wrong answers.
3. Read each question carefully and answer in the OMR sheet provided for each question with only blue/ black pen to fill the circles in the OMR Sheet.
4. Return the question paper along with the OMR sheet.

Time: 90 Minutes

Venue: _____.

[35X1=35]

Part-B

1. Steel passivates in concrete due to it's
 - A. High pH
 - B. Low permeability of concrete
 - C. High compressive strength
 - D. Low pH
2. To determine the modulus of rupture, the size of test specimen used is
 - A. 150 x150 x500 mm
 - B. 100 x100 x700 mm
 - C. 150 x150 x700 mm
 - D. 100 x100 x500 mm
3. The property of the ingredients to separate from each other while placing the concrete is called
 - A. segregation
 - B. compaction
 - C. shrinkage
 - D. bulking
4. Air entrainment in the concrete increases
 - A. Workability
 - B. Strength
 - C. The effects of temperature variations
 - D. The unit weight
5. Admixtures which cause early setting and hardening of concrete are called
 - A. Workability admixtures
 - B. Accelerators
 - C. Retarders
 - D. Air entraining agents



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6. If a beam fails in bond, then its bond strength can be increased most economically by
- A. Increasing the depth of beam
 - B. Using thinner bars but more in number
 - C. Using thicker bars but less in number
 - D. Providing vertical stirrups
7. Minimum grade of concrete to be used in reinforced concrete as per IS:456-2000 is
- A. M15
 - B. M20
 - C. M 10
 - D. M25
8. According to IS : 456-2000, the column or strut is the member whose effective length is greater than
- A. The least lateral dimension
 - B. 2 times the least lateral dimension
 - C. 3 times the least lateral dimension
 - D. 4 times the least lateral dimension
9. Minimum thickness of load bearing RCC wall should be
- A. 50 mm
 - B. 100 mm
 - C. 150 mm
 - D. 200 mm
10. The main reason for providing number of reinforcing bars at a support in a simply supported beam is to resist in that zone
- A. Compressive stress
 - B. Shear stress
 - C. Bond stress
 - D. Tensile stress
11. The depth of footing for an isolated column is governed by
- i) maximum bending moment
 - ii) shear force
 - iii) punching shear
- The correct answer is
- A. only (i)
 - B. (i)and(ii)
 - C. (i) and (iii)
 - D. (i), (ii) and (iii)
12. Due to shrinkage stresses, a simply supported beam having reinforcement only at bottom tends to
- A. Deflect downward
 - B. Deflect upward
 - C. Deflect downward or upward
 - D. None of the above



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13. A beam curved in plan is designed for
 - A. Bending moment and shear
 - B. Bending moment and torsion
 - C. Shear and torsion
 - D. Bending moment, shear and torsion
14. The purpose of reinforcement in pre-stressed concrete is
 - A. To provide adequate bond stress
 - B. To resist tensile stresses
 - C. To impart initial compressive stress in concrete
 - D. To impart initial tensile stress in concrete
15. Stress strain curve of high tensile steel
 - A. Has a definite yield point
 - B. Does not show definite yield point but yield point is defined by 0.1% proof stress
 - C. Does not show definite yield point but yield point is defined by 0.2% proof stress
 - D. Does not show definite yield point but yield point is defined by 2% proof stress,
16. Excess free lime in OPC causes
 - A. Increase in compressive strength
 - B. Prolonged final setting time
 - C. Unsoundness of cement
 - D. Lower heat of hydration
17. As the water to cement ratio in cement mortar increases
 - A. Dormant period duration decreases
 - B. Compressive strength at 28 days decreases
 - C. Peak temperature reached during hydration increases
 - D. The time to reach the peak remains unaffected
18. When compression test is carried out on a concrete cylinder of $L/D = 2$, the mid height of the cylinder is in a state of X. Because of this state of stress, the cracks formed at the centre are Y. Find A and B from the options below.
 - A. X: Pure shear Y: Diagonal
 - B. X: Pure tension Y: Vertical
 - C. X: Pure compression Y: Vertical
 - D. X: Combination of compression and tension Y: Horizontal
19. Steel embedded in uncontaminated concrete does not corrode due to –
 - A. Low pH of concrete pore solution and formation of layer of initial corrosion products on steel.
 - B. High pH of concrete pore solution and formation of layer of initial corrosion products on steel.
 - C. Formation of layer of low pH cements protecting the steel.
 - D. Steel cannot corrode in presence of portlandite
20. Which of the following causes a decrease in per capita consumption?
 - A. Use of metering system
 - B. Good quality of water
 - C. Better standard of living of the people
 - D. Hotter climate



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21. Ground water is usually free from
- A. Suspended impurities
 - B. Dissolved impurities
 - C. Both suspended and dissolved impurities
 - D. None of the above
22. The maximum permissible limit for flouride in drinking water is
- A. 0.1 mg/litre
 - B. 1.5 mg/litre
 - C. 5 mg/litre
 - D. 10 mg/litre
23. Disinfection of water results in
- A. Removal of turbidity
 - B. Removal of hardness
 - C. Killing of disease bacteria
 - D. Complete sterilisation
24. Canal aligned nearly parallel to the contours of a Country in known as
- A. Side slope canal
 - B. Contour canal
 - C. Water shed canal
 - D. Ridge canal
25. The measure to remove water logging of land, is
- A. To reduce percolation from canals and water courses
 - B. To increase outflow from the ground water reservoir
 - C. Both (a) and (b)
 - D. Neither (a) nor (b)
26. For a standing crop, the consumptive use of water is equal to the depth of water
- A. Transpired by the crop
 - B. Evaporated by the crop
 - C. Transpired and evaporated by the crop
 - D. Used by the crop in transpiration, evaporation and also the quantity of water evaporated from adjacent soil
27. In a canal syphon, the flow is
- A. Under atmospheric pressure
 - B. Pipe flow
 - C. With critical velocity
 - D. Under negative pressure
28. The ratio of the rate of change of discharge of an outlet and parent channel, is known as
- A. Efficiency



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- B. Sensitivity
 - C. Flexibility
 - D. Modular limit
29. By providing sufficient edge distance, which of the following failures of riveted joint can be avoided?
- A. Tension failure of the plate
 - B. Shear failure of the rivet
 - C. Shear failure of the plate
 - D. Crushing failure of the rivet
30. Bolts are most suitable to carry
- A. Shear
 - B. Bending
 - C. Axial tension
 - D. Shear and bending
31. Shear buckling of web in a plate girder is prevented by using
- A. Vertical intermediate stiffener
 - B. Horizontal stiffener at neutral axis
 - C. Bearing stiffener
 - D. None of the above
32. Steel tanks are mainly designed for
- A. Weight of tank
 - B. Wind pressure
 - C. Water pressure
 - D. Earthquake forces
33. The longitudinal shear stresses acting on the surface between the steel and concrete are called
- A. Bond stresses
 - B. Tensile stresses
 - C. Compressive stresses
 - D. Shear stresses
34. The mechanism method and the statical method give
- A. Lower and upper bounds respectively on the strength of structure
 - B. Upper and lower bounds respectively on the strength of structure
 - C. Lower bound on the strength of structure
 - D. Upper bound on the strength of structure
35. Shape factor is a property which depends
- A. Only on the ultimate stress of the material
 - B. Only on the yield stress of the material
 - C. Only on the geometry of the section
 - D. Both on the yield stress and ultimate stress of material





Mechanical Engineering

Part – B

[35x1=35]

1. The increase of temperature
 - (a) increases the viscosity of a liquid
 - (b) decreases the viscosity of a liquid
 - (c) decreases the viscosity of a gas
 - (d) increases the viscosity of a gas
2. Stoke is the unit of
 - (a) surface tension
 - (b) viscosity
 - (c) kinematic viscosity
 - (d) kinematic energy
3. The multiplying factor for converting one poise into MKS unit of dynamic viscosity is
 - (a) 9.81
 - (b) 98.1
 - (c) 981
 - (d) 0.981
4. Triangle law of forces states that if two forces acting at a point are represented in magnitude and direction by the two sides of the triangle taken in order, then their resultant is given by the
 - (a) third side of the triangle taken in the same order
 - (b) third side of the triangle taken in the opposite order
 - (c) sum of the two forces acting
 - (d) sum of the two opposite force
5. The information about the production schedule is obtained from
 - (a) starting diagram
 - (b) Gnatt chart
 - (c) distribution curve
 - (d) travel chart.
6. Lami's theorem states that if
 - (a) three forces acting at a point are in equilibrium, they can be represented by the three sides of a triangle.
 - (b) the three forces acting at a point can be represented in magnitude and direction by the sides of a triangle, the forces are in equilibrium.
 - (c) three forces acting at a point are in equilibrium, each force is proportional to the sine of the angle between the other two.
 - (d) two forces acting at a point are in equilibrium, they can be represented by the three sides of a triangle.



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7. A closed system is one which
- (a) permits the passage of energy and matter across the boundaries
 - (b) permits the passage of energy across the boundary but does not permit the passage of matter
 - (c) does not permit the passage of energy and matter across the boundary
 - (d) does not permit the passage of energy but permits the passage of matter across it.
8. An open system is one which
- (a) permits the passage of energy and matter across the boundaries
 - (b) permits the passage of energy across the boundary but does not permit the passage of matter
 - (c) does not permit the passage of energy and matter across the boundary
 - (d) permits the passage of energy and not the matter across the boundaries
9. An isolated system is one which
- (a) permits the passage of energy and matter across the boundaries
 - (b) permits the passage of energy only
 - (c) does not permit the passage of energy and matter across it
 - (d) permits the passage or mass only
10. In an I.C. engine fuel is
- (a) burnt outside the cylinder
 - (b) inside the cylinder
 - (c) not burnt anywhere
 - (d) outside the cylinder
11. The power produced inside the cylinder of an I.C. engine is known as
- (a) brake power
 - (b) indicated power
 - (c) frictional power
 - (d) frictional
12. The net indicated power (I.P.) of an I.C. engine given by indicator diagram is equal to
- (a) total power produced + pumping power
 - (b) total power produced – pumping power
 - (c) total power produced pumping power
 - (d) total power produced x pumping power
13. Octane number of the fuel used commercially for diesel engine in India is in the range
- (a) 80 to 90
 - (b) 60 to 80
 - (c) 60 to 70
 - (d) 40 to 45
14. For Parson's reaction steam turbine, degree of reaction is
- (a) 75%
 - (b) 100%
 - (c) 50%
 - (d) 60%



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15. Benson boiler produces steam upto a rate of
- (a) 100 kg/hr only
 - (b) 104 kg/hr
 - (c) 135 ton/hr only
 - (d) 100 kg/hr.
16. The clearance volume is provided in reciprocating compressors to
- (a) reduce the work done
 - (b) to increase the volumetric efficiency
 - (c) provide space for valves and also to be sure that the piston does not strike the cylinder at the end of the stroke
 - (d) to decrease the volumetric efficiency
17. The clearance ratio is defined as the ratio of
- (a) clearance volume to swept volume
 - (b) clearance volume to cylinder volume
 - (c) swept volume to clearance volume
 - (d) swept volume to cylinder volume
18. The process, which prescribes the sequence of operation to be followed, is known as
- (a) dispatching
 - (b) scheduling
 - (c) routing
 - (d) loading.
19. The rate of heat transfer is constant if
- (a) temperature decreases with time
 - (b) temperature increases with time
 - (c) temperature is constant with time
 - (d) no change with time
20. The ratio of shear stress to shear strain is called
- (a) Poisson's ratio
 - (b) bulk modulus
 - (c) modulus of rigidity
 - (d) modulus of elasticity
21. The ratio of normal stress of each face of a solid cube to volumetric strain is called
- (a) Poisson's ratio
 - (b) bulk modulus
 - (c) modulus of rigidity
 - (d) modulus of elasticity
22. Hooke's law holds good upto
- (a) proportional
 - (b) yield point
 - (c) elastic limit
 - (d) plastic limit



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23. The angle made by the face of the tool and the plane parallel to the base of the cutting tool, is known as
- (a) clearance angle
 - (b) rake angle
 - (c) cutting angle
 - (d) lip angle
24. The only angle on which the strength of the tool depends, is
- (a) clearance angle
 - (b) rake angle
 - (c) cutting angle
 - (d) lip angle
25. Which one of the following is a lower pair?
- (a) ball and roller bearing
 - (b) automobiles steering gear
 - (c) cam and follower
 - (d) belt and chain drives
26. The endurance limit of a material, subjected to fatigue loading
- (a) increases with the increase of ultimate tensile strength
 - (b) increases with the decrease of ultimate tensile strength
 - (c) is independent of ultimate tensile strength
 - (d) is dependent of ultimate tensile strength
27. Which of the following materials is having maximum ratio of the endurance limit to the ultimate tensile strength?
- (a) cast steel
 - (b) cast iron
 - (c) steel
 - (d) non-ferrous metals
28. Which of the following materials is having minimum ratio of the endurance limit to the ultimate tensile strength?
- (a) cast steel
 - (b) cast iron
 - (c) steel
 - (d) non-ferrous metals
29. In the periodical table, elements are arranged in order of increasing
- (a) atomic number
 - (b) atomic weight
 - (c) molecular weight
 - (d) molecule number
30. For tougher materials like copper
- (a) positive rake angle is provided
 - (b) negative rake angle is provided
 - (c) zero rake angle is provided
 - (d) any rake angle is provided



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31. The extra electrons, in the outermost incomplete main shell, are called
- (a) valence electrons
 - (b) extra electrons
 - (c) surplus electrons
 - (d) neutral electron
32. The process, which determines the programmer for the operations, is known as
- (a) dispatching
 - (b) scheduling
 - (c) routing
 - (d) loading
33. In orthogonal cutting of metals
- (a) three components of the cutting forces, which are mutually perpendicular are acting at the cutting edge
 - (b) two components of the cutting forces, which are perpendicular, are acting on the cutting tool
 - (c) one component of the cutting force, is acting on the cutting tool
 - (d) two components of the cutting force, is acting on the cutting tool
34. In oblique cutting of metals
- (a) three components of the cutting forces, which are mutually perpendicular are acting at the cutting edge.
 - (b) two components of the cutting forces, which are perpendicular, are acting on the cutting tool
 - (c) one component of the cutting force, is acting on the cutting tool
 - (d) two components of the cutting force, is acting on the cutting tool
35. The engineering, which aims at minimizing the cost without change in quality of the product, is known as
- (a) queuing theory
 - (b) network analysis
 - (c) value engineering
 - (d) game theory





CSE

Part-B

[35x1=35]

1. Which one of the following kinds of derivation is used by LR parsers?

- a) Rightmost
- b) Leftmost in reverse
- c) Rightmost in reverse
- d) Leftmost

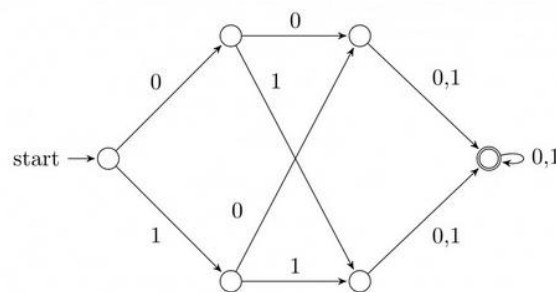
2. Consider the following grammar $S \rightarrow aSB|d$, $B \rightarrow b$. The number of reduction steps taken by a bottom-up parser while accepting the string 'aaadbbb' is

- a) 6
- b) 7
- c) 8
- d) 9

3. Consider the languages $L_1 = \phi$ and $L_2 = \{a\}$. Which one of the following represents $L_1 L_2^* \cup L_1^*$?

- a) $\{\epsilon\}$
- b) ϕ
- c) a^*
- d) $\{\epsilon, a\}$

4. Consider the following deterministic finite automaton (DFA).



The number of strings of length 8 accepted by the above automaton is

- a) 64
- b) 128
- c) 256
- d) 512

5. There is a regular expression $r = (11 + 111)^*$ over $\Sigma = \{0, 1\}$. Then what are the number of states in minimal NFA and DFA.



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- a) N – 3, D – 4
 - b) N – 3, D – 3
 - c) N – 4, D – 3
 - d) N – 4, D – 4
6. Consider that a computer on a 10Mbps network is regulated by a token bucket. The token bucket is filled at a rate of 2Mbps. It is initially filled to capacity with 16 Megabits. What is the maximum duration for which the computer can transmit at the full 10Mbps?
- a) 8 seconds
 - b) 5 seconds
 - c) 2 seconds
 - d) 1.6 seconds
7. One of the header fields in an IP datagram is the Time to Live (TTL) field. Which of the following statements best explains the need for this field?
- a) It can be used to prioritize packets
 - b) It can be used to reduce delays
 - c) It can be used to optimize throughput
 - d) It can be used to prevent packet looping
8. Which one of the statements given below is incorrect about HTTP cookies?
- a) A cookie is a piece of code that has the potential to compromise the security of an internet user.
 - b) A cookie has an expiry date and time.
 - c) A cookie gains entry to the user's work area through an HTTP header.
 - d) Cookies can be used to track a user's browsing pattern at a particular site.
9. The minimum positive integer p such that $(3^p \bmod 17) = 1$ is
- a) 5
 - b) 8
 - c) 12
 - d) 16
10. A sender is employing public key cryptography to send a secret message to a receiver. Which one of the following statement is true?
- a) Sender encrypts using receiver's public key
 - b) Sender encrypts using his own public key
 - c) Receiver decrypts using sender's public key
 - d) Receiver decrypts using his own public key
11. Consider a schema $R(A, B, C, D)$ and functional dependencies $A \rightarrow B$ and $C \rightarrow D$. Then the decomposition of R into $R_1(A, B)$ and $R_2(C, D)$ is



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- a) dependency preserving and loss less join
- b) loss less join but not dependency preserving
- c) dependency preserving but not loss less join
- d) not dependency preserving and not loss less join

12. Consider the following two statements about database transaction schedules:

I. Strict two-phase locking protocol generates conflict serializable schedules that are also recoverable.

II. Timestamp-ordering concurrency control protocol with Thomas Write Rule can generate view serializable schedules that are not conflict serializable.

Which of the above statements is/are TRUE?

- a) Both I and II
- b) I only
- c) II only
- d) Neither I nor II

13. B⁺-trees are preferred to binary trees in databases because

- a) disk capacities are greater than memory capacities
- b) disk access is much slower than memory access
- c) disk data transfer rates are much less than memory data transfer rates
- d) disks are more reliable than memory

14. A company needs to develop digital signal processing software for one of its newest inventions. The software is expected to have 4000 lines of code. The company needs to determine the effort in person months needed to develop this software using basic COCOMO model. The multiplicative factor for this model is given as 2.8 for the software development on embedded systems. While the exponentiation factor is given as 1.20. What is the estimated effort in person months?

- a) 234.25
- b) 932.50
- c) 287.80
- d) 122.40

15. Consider the following statements about the cyclomatic complexity of the control flow graph of a program module. Which of these are TRUE?

I. The cyclomatic complexity of a module is equal to the maximum number of linearly independent circuits in the graph.

II. The cyclomatic complexity of a module is the number of decisions in the module plus one, where a decision is effectively any conditional statement in the module.

III. The cyclomatic complexity can also be used as a number of linearly independent paths that should be tested during path coverage testing.



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- a) I and II
- b) II and III
- c) I and III
- d) I, II and III

16. What does the given program print?

```
char c[ ] = "VMRF2023"  
char *p = c;  
printf ("%s", p + p[3] - p[1]);
```

- a) VMRF2023
- b) 2023
- c) F2023
- d) 023

17. What is the minimum number of gates required to implement the Boolean function $(AB + C)$ if we have to use only 2-input NOR gates?

- a) 2
- b) 3
- c) 4
- d) 5

18. Which of the following scheduling algorithms is non-preemptive?

- a) Round Robin
- b) First-In First-Out
- c) Multilevel Queue Scheduling
- d) Multilevel Queue Scheduling with feedback

19. The minimum number of page frames that must be allocated to a running process in a virtual memory environment is determined by

- a) the instruction set architecture
- b) page size
- c) physical memory size
- d) number of processes in memory

20. For a pipelined CPU with a single ALU, consider the following situations

1. The $j+1$ instruction use the result of the j -th instruction as an operand
2. The execution of a conditional jump instruction
3. The j -th and $j+1$ instruction require the ALU at the same time

Which of the above can cause a hazard?



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- a) 1 and 2 only
 - b) 2 and 3 only
 - c) 3 only
 - d) 1, 2 and 3
21. The amount of ROM needed to implement a 4-bit multiplier is
- a) 64 bits
 - b) 128 bits
 - c) 1K bits
 - d) 2K bits
22. In a binary tree, the number of internal nodes of degree 1 is 5, and the number of internal nodes of degree 2 is 10. The number of leaf nodes in the binary tree is
- a) 10
 - b) 11
 - c) 12
 - d) 15
23. Which of the following sequences of array elements forms a heap?
- a) {23, 17, 14, 6, 13, 10, 1, 12, 7, 5}
 - b) {23, 17, 14, 6, 13, 10, 1, 5, 7, 12}
 - c) {23, 17, 14, 7, 13, 10, 1, 5, 6, 12}
 - d) {23, 17, 14, 7, 13, 10, 1, 12, 5, 7}
24. An array X of n distinct integers is interpreted as a complete binary tree. The index of the first element of the array is 0. The index of the parent of element X[i], $i \neq 0$ is?
- a) $\text{lowerbound}[i/2]$
 - b) $\text{upperbound}[(i-1)/2]$
 - c) $\text{upperbound}[i/2]$
 - d) $\text{upperbound}[i/2] - 1$
25. Consider two strings A="qpqrr" and B="pqprrp". Let x be the length of the longest common subsequence (not necessarily contiguous) between A and B and let y be the number of such longest common subsequences between A and B. Then $x + 10y = \underline{\hspace{2cm}}$
- a) 14
 - b) 24
 - c) 22
 - d) 34
26. Consider three decision problems P1, P2 and P3. It is known that P1 is decidable and P2 is undecidable. Which one of the following is TRUE?



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- a) P3 is decidable if P1 is reducible to P3
- b) P3 is undecidable if P3 is reducible to P2
- c) P3 is undecidable if P2 is reducible to P3
- d) P3 is decidable if P3 is reducible to P2's complement

27. The time complexity of computing the transitive closure of a binary relation on a set of elements is known to be:

- a) $O(n)$
- b) $O(n \log n)$
- c) $O(n^{3/2})$
- d) $O(n^3)$

28. If one uses straight two-way merge sort algorithm to sort the following elements in ascending order 20, 47, 15, 8, 9, 4, 40, 30, 12, 17 then the order of these elements after the second pass of the algorithm is:

- a) 8,9,15,20,47,4,12,17,30,40
- b) 8,15,20,47,4,9,30,40,12,17
- c) 15,20,47,4,8,9,12,30,40,17
- d) 4,8,9,15,20,47,12,17,30,40

29. Let X is a square matrix. Consider the following two statements on X.

- I. X is invertible.
- II. Determinant of X is non-zero.

Which one of the following is TRUE?

- a) I implies II; II does not imply I
- b) II implies I; I does not imply II
- c) I does not imply II; II does not imply I
- d) I and II are equivalent statements.

30. Consider a simple undirected graph of 10 vertices. If the graph is disconnected, then the maximum number of edges it can have is

- a) 16
- b) 26
- c) 36
- d) 46.

31. A sender S sends a message m to receiver R, which is digitally signed by S with its private key. In this scenario, one or more of the following security violations can take place.

- I. S can launch a birthday attack to replace m with a fraudulent message.
- II. A third party attacker can launch a birthday attack to replace m with a fraudulent message.
- III. R can launch a birthday attack to replace m with a fraudulent message.



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Which of the following are possible security violations?

- a) I and II only
- b) I only
- c) II only
- d) II and III only.

32. An organization has a class B network and wishes to form subnets for 64 departments. The subnet mask would be

- a) 255.255.0.0
- b) 255.255.64.0
- c) 255.255.128.0
- d) 255.255.252.0.

33. Consider the following statements:

- I. The smallest element in a max-heap is always at a leaf node.
- II. The second largest element in a max-heap is always a child of the root node.
- III. A max-heap can be constructed from a binary search tree in $\Theta(n)$ time.
- IV. A binary search tree can be constructed from a max-heap in $\Theta(n)$ time.

Which of the above statements is/are TRUE?

- a) II, III and IV
- b) I, II and III
- c) I, III and IV
- d) I, II and IV

34. A computer has six tape drives, with n processes competing for them. Each process may need two drives. What is the maximum value of n for the system to be deadlock free?

- a) 6
- b) 5
- c) 4
- d) 3.

35. Which one of the following is NOT desired in a good Software Requirement Specifications (SRS) document?

- a) Functional Requirements
- b) Non-Functional Requirements
- c) Goals of Implementation
- d) Algorithms for Software Implementation





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