



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

CSE

Instructions:

1. Answer all the questions.
2. Read each question carefully and write the correct answer for each question chosen by you with black/blue pen in the answer sheet provided.
3. No negative marks for wrong answers.
4. Return the question paper along with the answer sheet.

Time: 90 Minutes Marks: 70

Venue:-----

Part B

[35X1=35]

1. Consider the regular expression $(0+1)(0+1), \dots, n$ times. The minimum state finite automation that recognizes the language represented by this regular expression contains
 - a. n states
 - b. $n+1$ states
 - c. $n+2$ states
 - d. $n-1$ states
2. The lexical analysis for a modern computer language such as java needs the power of which one of the following machine model in a necessary and sufficient sense?
 - a. Finite state automata
 - b. Deterministic pushdown automata
 - c. Non-Deterministic pushdown automata
 - d. Turing machine
3. A minimum state deterministic finite automaton accepting the language $L = \{w \mid w \in \{0,1\}^*, \text{ number of } 0\text{s and } 1\text{s in } w \text{ are divisible by } 3 \text{ and } 5, \text{ respectively}\}$ has
 - a. 15 states
 - b. 11 states
 - c. 10 states
 - d. 9 states



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4. The probability that it will rain today is 0.5. The probability that it will rain tomorrow is 0.6. The probability that it will rain either today or tomorrow is 0.7. That is the probability that it will rain today and tomorrow?
- 0.3
 - 0.25
 - 0.35
 - 0.4
5. The rank of the $\begin{bmatrix} 0 & 0 & -3 \\ 9 & 3 & 5 \\ 3 & 1 & 1 \end{bmatrix}$ is
- 0
 - 1
 - 2
 - 3
6. Which of the following is /are tautology?
- $(a \vee b) \rightarrow (b \wedge c)$
 - $(a \wedge b) \rightarrow (b \vee c)$
 - $(a \vee b) \rightarrow (b \rightarrow c)$
 - $(a \rightarrow b) \rightarrow (b \rightarrow c)$
7. Which of the following is not a form of memory?
- Instruction Cache
 - Instruction Register
 - Instruction Opcode
 - Translation look aside Bugger
8. 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?
- 6
 - 5
 - 4
 - 3
9. A counting semaphore was initialized to 10. Then 6 P (wait) operations and 4 V (signal) operations were completed on this semaphore. The resulting value of the semaphore
- 0
 - 8
 - 10
 - 12



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10. The Boolean function $x'y' + xy + x'y$ is equivalent to
- $x' + y'$
 - $x + y$
 - $x + y'$
 - $x' + y$
11. The smallest integer that can be represented by an 8-bit number in 2's complement form is
- 256
 - 128
 - 127
 - 0
12. Let \oplus and \odot denote the Exclusive OR and Exclusive NOR operations, respectively. Which one of the following is NOT CORRECT?
- $\overline{P \oplus Q} = P \otimes Q$
 - $\overline{P} \oplus Q = P \otimes Q$
 - $\overline{P} \oplus \overline{Q} = P \otimes Q$
 - $(P \oplus \overline{P}) \oplus Q = (P \otimes \overline{P}) \oplus \overline{Q}$
13. Consider a B+ - tree in which the maximum number of keys in a node is 5. What is the minimum number of keys in any non-root node?
- 1
 - 2
 - 3
 - 4
 - e.
14. Suppose the numbers 7, 5, 1, 8, 3, 6, 0, 9, 4, 2 are inserted in that order into an initially empty binary search tree. The binary search tree uses the usual ordering on natural numbers. What is the in-order traversal sequence of the resultant tree?
- 7 5 1 0 3 2 4 6 8 9
 - 0 2 4 3 1 6 5 9 8 7
 - 0 1 2 3 4 5 6 7 8 9
 - 9 8 6 4 2 3 0 1 5 7
15. An adjacency matrix representation of graph cannot contain information
- Node
 - Edges
 - Direction of edge
 - Parallel edge



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16. Algorithm which solves the all path shortest path problem
- Dijkstra's Algorithm
 - Floyd's Algorithm
 - Prim's Algorithm
 - Warshalls Algorithm
17. Minimum number of unique colors required for vertex coloring of a graph is called?
- Vertex matching
 - Chromatic index
 - Chromatic number
 - Color number
18. The travelling salesman problem can be solved in
- Polynomial time using dynamic programming algorithm
 - Polynomial time using branch-and-bound algorithm
 - Exponential time using dynamic programming algorithm
 - Polynomial time using backtracking
19. Consider a relation scheme $R = (A, B, C, D, E, H)$ on which the following functional dependencies hold: $\{A \rightarrow B, BC \rightarrow D, E \rightarrow C, D \rightarrow A\}$. What are the candidate keys of R?
- AE, BE
 - AE, BE, DE
 - AEH, BEH, BCH
 - AEH, BEH, DEH
20. How many serial schedules are possible using n-transactions?
- $(n - 1)!$
 - $n!$
 - $n(n - 1)!$
 - $n(n + 1)!/2$
21. Which of the following is TRUE?
- Every relation in 3NF is also in BCNF
 - A relation R is in 3NF if every non-prime attribute of R is fully functionally dependent on every key of R
 - Every relation in BCNF is also in 3NF
 - No relation can be in both BCNF and 3NF
22. Register renaming is done in pipelined processors
- As an alternative to register allocation at compile time
 - For efficient access to function parameters and local variables
 - To handle certain kinds of hazards
 - As part of address translation



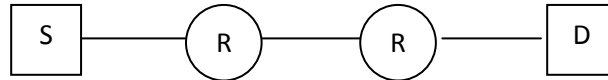
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23. A pipeline P is found to provide a speedup of 6.16 when operating at 100 MHz and an efficiency of 88 percent. How many stages does P have?
- 5
 - 6
 - 7
 - 8
24. How many 32K x 1 RAM chips are needed to provide a memory capacity of 256 K-bytes
=
- 8
 - 32
 - 64
 - 128
25. Which of the following statements is false?
- An unambiguous grammar has same left most and right most derivation
 - An LL(1) parser is a top-down parser
 - LALR is more powerful than SLR
 - An ambiguous grammar can never be LR(K) for any k
26. In a compiler the module that checks every character of the source text is called
- The code generator
 - The code optimizer
 - The lexical analyzer
 - The syntax analyzer
27. Which one of the following kinds of derivation is used by LR parsers?
- Leftmost in reverse
 - Rightmost in reverse
 - Leftmost
 - Rightmost
28. Which of the following protocol pairs can be used to send and retrieve e-mail (in that order)?
- SMTP, MIME
 - SMTP, POP3
 - IMAP, POP3
 - IMAP, SMTP



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29. Assume that source S and destination D are connected through two intermediate routers labeled R. Determine how many time each packet has to visit the network layer and the data link layer during a transmission from S to D.



- Network layer – 4 times and Data linklayer – 4 times
 - Network Layer – 4 times and Data link layer – 3 times
 - Network Layer – 4 times and Data link layer – 6 times
 - Network Layer – 2 times and Data link layer – 6 times
30. Using public key cryptography, X adds a digital signature to message M, encrypts $\langle M, \sigma \rangle$, and sends it to Y, where it is decrypted. Which one of the following sequences of keys is used for the operations?
- Encryption: X's private key followed by Y's private key; Decryption: X's public key followed by Y's public key
 - Encryption: X's private key followed by Y's public key; Decryption: X's public key followed by Y's private key
 - Encryption: X's public key followed by Y's private key; Decryption: Y's public key followed by X's private key
 - Encryption: X's private key followed by Y's public key; Decryption: Y's private key followed by X's public key
31. Which one of the following is not a client server application?
- Internet chat
 - Web browsing
 - E-mail
 - Ping
32. The coupling between different modules of a software is categorized as follows
- Content coupling
 - Common coupling
 - Control coupling
 - Stamp coupling
 - Data coupling

Coupling between modules can be ranked in the order of strongest (least desirable) to weakest (most desirable) as follows.



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- a. I-II-III-IV-V
- b. V-IV-III-II-I
- c. I-III-V-II-IV
- d. IV-II-V-III-I

33. Which one of the following statements is NOT correct 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 gains entry to the user's work area through an HTTP header
- c. A cookie has an expiry date and time
- d. Cookies can be used to track the browsing pattern of a user at a particular site

34. The problems 3-SAT and 2-SAT are

- a. Both in P
- b. Both NP complete
- c. NP-complete and in P respectively
- d. Undecidable and NP-complete respectively

35. The following C declarations

```
struct node{  
int i;  
float j;  
};  
Struct node *s[10];  
Define s to be
```

- a. An array, each element of which is a pointer to a structure of type node
- b. A structure of 2 fields, each field being a pointer to an array of 10 elements
- c. A structure of 3 field: an integer, a float, and an array of 10 elements
- d. An array, each element of which is a structure of type node.





ECE

Part B

[35X1=35]

1. The number of interrupt lines in 8085 is

- A. 2
- B. 3
- C. 4
- D. 5

2. An I/O processor controls the flow of information between

- A. cache memory and I/O devices
- B. main memory and I/O devices
- C. two I/O devices
- D. cache and main memory

3. The five flags in 8085 are designated as

- A. Z, CY, S, P and AC
- B. D, Z, S, P, AC
- C. Z, C, S, P, AC
- D. Z, CY, S, D, AC

4. The timing difference between a slow memory and fast processor can be resolved if

- A. processor is capable of waiting
- B. external buffer is used
- C. either (a) or (b)
- D. neither (a) nor (b)

5. In 8086 the number of bytes which can be addressed directly is about

- A. 1000
- B. 10000
- C. 100000
- D. one million



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6. A cordless telephone using separate frequencies for transmission in base and portable units is known as
 - A. duplex arrangement
 - B. half duplex arrangement
 - C. either (a) or (b)
 - D. neither (a) nor (b)

7. For attenuation of high frequencies we should use
 - A. shunt capacitance
 - B. series capacitance
 - C. inductance
 - D. resistance

8. A modem is classified as low speed if data rate handled is
 - A. upto 100 bps
 - B. upto 250 bps
 - C. upto 400 bps
 - D. upto 600 bps

9. VSB modulation is preferred in TV because
 - A. it reduces the bandwidth requirement to half
 - B. it avoids phase distortion at low frequencies
 - C. it results in better reception
 - D. none of the above

10. . How many free electrons does a p type semiconductor has?
 - A. only those produced by thermal energy
 - B. only those produced by doping
 - C. those produced by doping as well as thermal energy
 - D. any of the above

11. Which of the following has highest resistivity?
 - A. Mica
 - B. Paraffin wax
 - C. Air
 - D. Mineral oil

12. The sensitivity of human eyes is maximum at
 - A. white portion of spectrum
 - B. green portion of spectrum
 - C. red portion of spectrum
 - D. violet portion of spectrum



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13. Parabolic and lens antenna used at
- A. microwave frequency
 - B. medium frequency
 - C. low frequency
 - D. high frequency
14. Which of the following statement regarding waveguides is incorrect?
- A. At waveguide can be coupled to a coaxial cable
 - B. At frequencies below the cut off value the wave progresses across the waveguide after total reflections
 - C. Waveguides are usually air filled hollow conducting metallic tubes for transmitting UHF and microwaves
 - D. Waveguides can handle large power at UHF and microwaves
15. The potential that appears at a point in space due to the current which caused it is called potential
- A. accelerating
 - B. retardation
 - C. oscillating
 - D. lagging the current
16. Which of the following impedance inversion is obtained?
- A. Short-circuited stub
 - B. A quarter wave line
 - C. Balun transformer
 - D. A half wave line
17. Tropospheric scatter is used with frequencies in the
- A. HF
 - B. VHF
 - C. UHF
 - D. VLF
18. A Yagi antenna has a driven antenna
- A. only
 - B. with a reflector
 - C. with one or more directors
 - D. with a reflector and one or more directors



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19. The power gain of a half-wave dipole with respect to an isotropic radiator is
- A. 2.15 db
 - B. 3 db
 - C. 4.15 db
 - D. 6 db
20. The first satellite to receive and transmit simultaneously
- A. Intelsat I
 - B. Agila I
 - C. Syncorn I
 - D. Telstar I
21. A helical antenna is used for satellite tracking because of
- A. circular polarization
 - B. maneuverability
 - C. beamwidth
 - D. gain
22. Repeaters inside communications satellites are known as
- A. Trancievers
 - B. Transponders
 - C. Transducers
 - D. TWT
23. Calculate the effective earth's radius if the surface refractivity is 301.
- A. 8493 km
 - B. 8493 mmi
 - C. 6370 km
 - D. 6370 mi
24. If k-factor is greater than 1, the array beam is bent
- A. Away from the earth
 - B. towards the ionosphere,
 - C. towards the earth
 - D. towards the outer space



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25. Which of the reception problems below that is not due to multipath?
- A. Delayed spreading
 - B. Rayleigh fading
 - C. Random Doppler shift
 - D. Slow fading
26. In microwave transmission using digital radio, what causes most intersymbol interference?
- A. Delayed spreading
 - B. Rayleigh fading
 - C. Random Doppler shift
 - D. Slow fading
27. At what position is the input signal inserted into a traveling-wave tube?
- A. At the cathode end of the helix
 - B. At the collector
 - C. At the collector end of the helix
 - D. At the control grid of the electron gun
28. A traveling-wave tube (TWT) amplifies by virtue of
- A. The absorption of energy by the signal from an electron stream
 - B. The effect of an external magnetic field
 - C. The energy contained the cavity resonators
 - D. The energy liberated form the collector
29. The highest frequency which a conventional vacuum-tube oscillator can generate is not limited by the
- A. Electron transit time
 - B. Distributed lead inductance
 - C. Inter-electrode capacitance
 - D. Degree of emission from the cathode
30. In spread spectrum technique
- A [] a modulated signal is modulated again
 - B [] a modulated signal is modulated twice again
 - C [] the power of a modulated signal is increased
 - D [v] the noise component of a modulated signal is decreased



31. The bandwidth required for amplitude modulation is
A [] half the frequency of modulating signal
B [] equal to the frequency of modulating signal
C [v] twice the frequency of modulating signal
D [] four times the frequency of modulating signal
32. BPSK stands for
A [v] Binary Phase Shifting Key
B [] Broad Phase Shifting Key
C [] Bit Phase Shifting Key
D [] Binary Pulse Shifting Key
33. In the stabilized reactance modulators AFC system
A [] the discriminator must have a fast time constant to prevent demodulation
B [] the higher discriminator frequency the better the oscillator frequency stability
C [] the discriminator frequency must not be too low, or the system will fail
D [v] phase modulation is converted into FM by the equalizer circuit
34. Bandwidth for practical PCM system is (where n is no. of channels, N length of PCM codes)
A [v] $2n N f_m$ Hz
B [] $4n f_m$ Hz
C [] $2n f_m$
D [] $(N + 1)f_m$
35. The Shannon-Hartley law
A [v] refers to noise
B [] defines bandwidth
C [] describes signalling rate
D [] refers to distortion





Mechanical Engineering

Part B

[35X1=35]

1. In pipe flow the critical Reynolds number is about
 - (a) 640
 - (b) 5×10^5
 - (c) 2000
 - (d) 64000
2. Stress strain relationship for Newtonian fluid is
 - (a) Parabolic
 - (b) Hyperbolic
 - (c) Linear
 - (d) Inverse type
3. The ratio of the velocity of flow V to the velocity of sound in the fluid medium is known as
 - (a) Fraude number
 - (b) Mach number
 - (c) Newton number
 - (d) coefficient of viscosity
4. The maximum thickness of boundary layer in a pipe of radius r is
 - (a) 0
 - (b) $r/2$
 - (c) r
 - (d) $2r$
5. Streamlines, streak lines and path lines are all identical in case of
 - (a) uniform flow
 - (b) steady flow
 - (c) unsteady flow
 - (d) non-uniform flow
6. The efficiency of carnot cycle may be increased by
 - (a) Increasing the highest temperature
 - (b) Decreasing the highest temperature
 - (c) Increasing the lowest temperature
 - (d) Keeping the lowest temperature constant



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7. Which of the following items is not a path function?
 - (a) Heat
 - (b) Work
 - (c) Kinetic energy
 - (d) Thermal conductivity

8. Which of the following has the highest calorific value?
 - (a) Anthracite coal
 - (b) Bituminous coal
 - (c) Peat
 - (d) Lignite

9. Change in enthalpy of a system is the heat supplied at
 - (a) Constant pressure
 - (b) Constant temperature
 - (c) Constant volume
 - (d) Constant entropy

10. What is the pressure of CO_2 gas with compressibility $z = 0.8$, if the ideal gas pressure of CO_2 is 10 Pa, all other variables are same?
 - (a) 5
 - (b) 8
 - (c) 10
 - (d) 14

11. Which of the following is the rate of heat transfer unit?
 - (a) Watt
 - (b) Pascal
 - (c) Joule
 - (d) Newton

12. Which of the following is an example of steady-state heat transfer?
 - (a) Electric bulb cools down by the surrounding atmosphere
 - (b) Chilling effect of cold wind on a warm body
 - (c) Boilers and turbines
 - (d) Cooling of I.C. engine

13. A person prefers to sit by a fire during cold winter months. Which of the following heat transfer types gives him with the most heat?
 - (a) Convection and radiation together
 - (b) Radiation will provide quick warmth
 - (c) If it is near the fire, convection sounds good
 - (d) Conduction from the fire



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14. Why are fins provided on a heat transfer surface?
- (a) Pressure drop of the fluid should be minimized
 - (b) Increase turbulence in flow for enhancing heat transfer
 - (c) Surface area is maximum to promote the rate of heat transfer
 - (d) Increase temperature gradient so as to enhance heat transfer
15. Design of shaft made of brittle material is based upon
- (a) Guest's Theory
 - (b) Rankine's Theory
 - (c) St. Venants Theory
 - (d) Von Mises Theory
16. Endurance limit of a beam subjected to pure bending decreases with
- (a) increase in the surface roughness and increase in the size of the beam
 - (b) decrease in the surface roughness and increase in the size of the beam
 - (c) decrease in the surface roughness and decrease in the size of the beam
 - (d) increase in the surface roughness and decrease in the size of the beam.
17. Large speed reductions (greater than 20) in one stage of a gear train are possible through
- (a) Spur gearing
 - (b) Worm gearing
 - (c) Bevel gearing
 - (d) Helical gearing
18. Pre-tensioning of a bolted joint is used to
- (a) strain harden the bolt head
 - (b) decrease stiffness of the bolted joint
 - (c) prevent yielding of the thread root
 - (d) increase stiffness of the bolted joint
19. Which one of the following is the most conservative fatigue failure criterion?
- (a) Soderberg
 - (b) Modified Goodman
 - (c) ASME Elliptic
 - (d) Gerber
20. A static load is mounted at the centre of a shaft rotating at uniform angular velocity. This shaft will be designed for
- (a) the maximum compressive stress (static)
 - (b) the maximum tensile stress (static)
 - (c) the maximum bending moment (static)
 - (d) fatigue loading



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21. Specify the sequence correctly
 - (a) Grain growth, recrystallisation, stress relief
 - (b) Stress relief, grain growth, recrystallisation
 - (c) Stress relief, recrystallisation, grain growth
 - (d) Grain growth, stress relief, recrystallisation

22. Which of the following material has maximum ductility?
 - (a) Mild steel
 - (b) Copper
 - (c) Nickel
 - (d) Aluminium

23. The ability of a material to absorb energy in the plastic range is called
 - (a) resilience
 - (b) creep
 - (c) fatigue strength
 - (d) toughness

24. The charge is fed into the blast furnace through the
 - (a) stack
 - (b) throat
 - (c) bosh
 - (d) tuyers

25. Nodular cast iron is produced by adding -----to the molten cast iron
 - (a) nickel
 - (b) chromium
 - (c) copper
 - (d) magnesium

26. The lower critical temperature
 - (a) decreases as the carbon content in steel increases
 - (b) increases as the carbon content in steel increases
 - (c) is same for all steels
 - (d) depends upon the rate of heating

27. If the shortest link is fixed, what type of mechanism is obtained?
 - (a) Crank rocker mechanism
 - (b) Linkage is not planar
 - (c) Double crank mechanism
 - (d) Double rocker mechanism

28. For a Whitworth quick return motion mechanism $\beta = 110$. Find the ratio of time of cutting stroke to time of return stroke.
 - (a) 0.42



- (b) 0.44
(c) 2.27
(d) 2.37
29. The smaller and generally the driver gear of a pair of mated gears is called -----
(a) rack
(b) pinion
(c) module
(d) pitch
30. Hot metal runner in blast furnace are lined with -----bricks
(a) silica
(b) carborundum
(c) fireclay
(d) magnesite
31. In forward extrusion process, the problem of friction is severe in case of
(a) lead
(b) aluminium
(c) tin
(d) steel
32. In submerged arc welding, the arc is struck between
(a) Consumable coated electrode and work piece
(b) Non-consumable electrode and work piece
(c) Consumable bare electrode and work piece
(d) Tungsten electrodes and work piece
33. The amperage used in arc welding depends upon
(a) work thickness
(b) electrode rod thickness
(c) arc gap
(d) other considerations
34. What is bilateral tolerance?
(a) Total tolerance is in one direction only
(b) Total tolerance is in both the directions
(c) May or may not be in one direction
(d) Tolerance provided all over the component body
35. Break-even analysis chart is drawn between
(a) overhead cost and fixed cost
(b) volume of production and income
(c) material cost and labour cost
(d) material cost only

