ENTRANCE EXAMINATION FOR ADMISSION, MAY 2010.

M.Tech. (ELECTRONICS)

COURSE CODE : 304

Register Number : [ ]

Signature of the Invigilator
(with date)

COURSE CODE : 304

Time : 2 Hours Max : 400 Marks

Instructions to Candidates :

1. Write your Register Number within the box provided on the top of ... and fill in the page 1 of the answer sheet using pen. ...r sheet. Violation of
2. Do not write your name anywhere in this booklet or this entails disqualification.
3. Read each question carefully and shade the relevant answer (A) or (B) or (C) or (D) in the relevant box in the ANSWER SHEET using HB pencil.
4. Avoid blind guessing. A wrong answer will fetch you –1 mark and the correct answer will fetch 4 marks.
5. Do not write anything in the question paper. Use the white sheets attached at the end for rough works.
6. Do not open the question paper until the start signal is given.
7. Do not attempt to answer after stop signal is given. Any such attempt will disqualify your candidature.
8. On stop signal, keep the question paper and the answer sheet on your table and wait for the invigilator to collect them.
9. Use of Calculators, Tables, etc. are prohibited.

1. The eigen values of the matrix A= $\begin{bmatrix} cos\theta & -sin\theta \\ sin\theta & cos\theta \end{bmatrix}$ are

(A) $e^{\pm i\theta}$ (B) $e^{\pm 2i\theta}$ (C) $e^{\pm 3i\theta}$ (D) $e^{\pm i\theta/2}$

2. Which one of the following matrices is skew-hermitian?

(A) $\begin{bmatrix} 0 & i \\ i & 0 \end{bmatrix}$ (B) $\begin{bmatrix} 0 & i \\ -i & 0 \end{bmatrix}$ (C) $\begin{bmatrix} i & 0 \\ 0 & i \end{bmatrix}$ (D) $\begin{bmatrix} i & 0 \\ 0 & -i \end{bmatrix}$

3. The sequence $\left(\frac{n}{e^n}\right)^{\infty}$ is

(A) Divergent (B) Convergent

(C) Monotonic increasing (D) Oscillating

4. We have m equations in n unknown and then the coefficient matrix A will be of the type $m \times n$. Let r be the rank of matrix. If $r < n$, then equation AX = 0 will have

(A) n-r linearly independent solution

(B) m-r linearly independent solution

(C) No linearly independent solution

(D) Infinite number of solutions

5. Fourier cosine transform of $f(x) = e^{-mx}$, m > 0 is

(A) $\frac{m}{m^2+a^2}$ (B) $\frac{1}{m^2+a^2}$ (C) $\frac{m}{m^2+a}$ (D) $\frac{m^2+a^2}{m}$

6. A nontrivial solution of Stern-Liouville boundary value problem are known as

(A) Root mean square values (B) Least square values

(C) Characteristic values (D) None of the above

7. $\int_a^b [f(x)]^2 dx + \sum_{n=1}^{N} (a_n - C_n)^2 + \sum_{n=1}^{N} (C_n)^2$ is equal to

(A) $\int_a^b [f(x) + SM(x)]^2 dx$ (B) $\int_a^b [f(x)]^2 [SM(x)]^2 dx)$

(C) $\int_a^b [f(x) - SM(x)]^2 dx$ (D) None of the above

8. The solution of $xdy - ydx - (1-x^2)\,dx = 0$ is

(A) $\frac{y}{x} + \frac{1}{x} + x = C$ (B) $\frac{x}{y} + \frac{1}{x} + x = C$

(C) $\frac{y}{x} - \frac{1}{x} + x = C$ (D) $\frac{y}{x} + \frac{1}{x} - x = C$

9. The solution of $\frac{1}{y^2} + \frac{dy}{dx} + \frac{1}{x} = \cos x - \sin x$ is

(A) $y = \sin x + Ce^x$ (B) $y = \sin x - Ce^x$

(C) $\frac{1}{y} = \sin x + Ce^x$ (D) $\frac{1}{y} = -\sin x + Ce^x$

10. If the population of a country doubles in 50 years, in how many years will it be treble under the assumption that the rate of increase is proportional to the number of inhabitants

(A) 97 years (B) 79 years

(C) 75 years (D) None of the above

11. The time required for a cylindrical tank of radius 2.5 m and height 3 m to empty through a round hole of radius 25 mm in the bottom of the tank, given that water will issue from such a hole with velocity approximately $2.5\sqrt{h}\ m/s$ 'h' being the depth of the water

(A) 3 hr 43 min (B) 3 hr 36 min

(C) 3 hr 34 min (D) 3 hr 30 min

12. The differential equation of the $y = \ln \sin(x - C_1) + C_2$ primitive is

(A) $y'' - y'^2 + 1 = 0$ (B) $y'' + y'^2 - 1 = 0$

(C) $y'' - y'^2 - 1 = 0$ (D) $y'' + y'^2 + 1 = 0$

13. Let $\emptyset(x, y, x)$ and $\emptyset(x + \Delta x, y + \Delta y, z + \Delta z)$ be the temperatures at two neighbouring points $P(x, y, x)$ and $Q(x + \Delta x, y + \Delta y, z + \Delta z)$ then

(A) $\frac{d\emptyset}{ds} = \nabla\emptyset . \frac{d\vec{r}}{ds}$ (B) $\frac{d\emptyset}{ds} = \nabla\emptyset \times \frac{d\vec{r}}{ds}$

(C) $\frac{d\emptyset}{ds} = \nabla\emptyset + \frac{d\vec{r}}{ds}$ (D) None of the above

14. If n is a constant, then $\nabla^2 r^n$ is equal to the

(A) $n(n-1)\, r^{n+2}$ (B) $n(n-1)\, r^{n-2}$

(C) $n(n+1)\, r^{n+2}$ (D) None of the above

15. The total work done in moving a particle in a force field given $F = 3xi - 5xj + 10xk$ along the curve $x = t^2 + 1, y = 2t^2$ and $z = t^3$ from $t = 1$ to $t = 2$ is

(A) 313 (B) 333 (C) 323 (D) 303

16. The value of $\frac{3x^{30}-i^{19}}{2i-1}$ is

(A) $1+i$ (B) $1-i$

(C) $(1+i)(1+i)$ (D) None of the above

17. A state-variable filter consists of

(A) One op-amp with multiple-feedback paths

(B) A summing amplifier and two integrators

(C) A summing amplifier and two differentiators

(D) Three Butterworth stages

18. The $cos^4\theta$ is equal to

(A) $\frac{1}{8}\cos 4\theta - \frac{1}{2}\cos 2\theta + \frac{3}{8}$ (B) $\frac{1}{8}\cos 4\theta - \frac{1}{2}\cos 2\theta - \frac{3}{8}$

(C) $\frac{1}{8}\cos 4\theta + \frac{1}{2}\cos 2\theta + \frac{3}{8}$ (D) None of the above

19. If $z_1 = 3 - 4i$ *and* $z_2 = -4 + 3i$ then $z_1 \times z_2$ is equal to

(A) -7 (B) 7 (C) $7+i$ (D) $7-i$

20. If $A = \{1, i, -i\}, B = \{2, 1, -i\}, C = \{i, -i, 1+i\}$ & $D = \{0, -i, 1\}$. Then $(A \cup C) \cap (B \cup D)$ is

(A) $\{1, i\}$ (B) $\{i, 1\}$

(C) $\{1, -i\}$ (D) None of the above

21. The $\lim_{x \to 1+i} (z^2 - 5x + 10)$ is equal to

(A) $5-3i$ (B) $5+3i$

(C) $(3+5i)$ (D) None of the above

22. When a low-pass and high-pass filter are cascaded to get a band-pass filter, the critical frequency of the low-pass filter must be

(A) Equal to the critical frequency of the high-pass filter

(B) Less than the critical frequency of the high-pass filter

(C) Greater than the critical frequency of the high-pass filter

(D) None of the above

23. If $W = \frac{1+z}{1-z}$ then $\frac{dW}{dz}$

(A) $\frac{z}{(1+z)^2}$ (B) $\frac{z-1}{(1+z)^2}$

(C) $\frac{z}{(1-z)^2}$ (D) None of the above

24. $\int \frac{dz}{\sqrt{z^2 \pm a^2}}$ is equal to

(A) $\ln (z \pm \sqrt{z^2 + a^2})$ (B) $\ln (z - \sqrt{z^2 \pm a^2})$

(C) $\ln (z \pm \sqrt{z^2 + a^2})$ (D) $\ln (z + \sqrt{z^2 \pm a^2})$

25. If for a real, continuous function $f(x), f(a)f(b) < 0$. Then in the range $[a, b], f(x) = 0$ has

(A) Only one root (B) At least one root

(C) No roots (D) Indeterminable number of roots

26. The value of $(a \pm jb)^{-1}$

(A) $\frac{a}{a^2-b^2} \mp j \frac{b}{a^2-b^2}$ (B) $\frac{a}{a^2+b^2} \pm j \frac{b}{a^2+b^2}$

(C) $\frac{a}{a^2+b^2} \mp j \frac{b}{a^2+b^2}$ (D) $\frac{a}{a^2-b^2} \pm j \frac{b}{a^2-b^2}$

27. The power factor of the more reactive load is

(A) Low (B) Infinite

(C) High (D) None of the above

28. What is the average value of the full wave rectified voltage peak value is 15 V?

(A) 9.52 V (B) 9.53 V (C) 9.55 V (D) 9.54 V

29. The Clapp oscillator is a variation of ———— oscillator with a capacitor added in series with the ————.

(A) Hartley, inductor (B) Colpitts, inductor

(C) Wein-bridge, Inductor (D) None of the above

30. The magnetic hystersis loop of a material most suitable for use in magnetic storage hard disk is a

(A) Loop with low coercivity

(B) Loop with high permeability and high saturation

(C) Loop with low remanence and high saturation

(D) Square loop.

31. When Q is less than 10, the Colpitts oscillator resonant frequency is

(A) $\frac{1}{2\pi\sqrt{LC_T}}$

(B) $\frac{1}{2\pi\sqrt{LC_T}}\sqrt{\frac{Q^2}{Q^2+1}}$

(C) $\frac{1}{2\pi\sqrt{LC_T}}\sqrt{\frac{Q^2}{Q^2-1}}$

(D) $\frac{1}{2\pi\sqrt{LC_T}}\sqrt{\frac{Q^2+1}{Q^2+1}}$

32. When a receiver is tuned from one RF frequency to another

(A) The IF changes by an amount equal to the local oscillator frequency

(B) The IF stays the same

(C) The local oscillator frequency changes by an amount equal to the audio frequency

(D) Both the local oscillator and the IF frequencies change

33. The operator which represents the two variables should commute if the Poissson bracket of two variables have value

(A) 1 (B) 0 (C) $i\hbar$ (D) $-i\hbar$

34. A PLL is locked onto an incoming signal with a frequency of 1 MHz at a phase angle of 50°. The VCO signal is at a phase angle of 20°. The peak amplitude of the incoming signal is 0.5 V and that of the VCO output signal is 0.5V and that of the VCO output signal. The VCO frequency and the value of the control voltage being fed back to the VCO at this point are

(A) 2 MHz, 0.152 V

(B) 1 MHz, 0.3 V

(C) 1 MHz, 0.152 V

(D) None of the above

35. An external pass transistor is used for

(A) Increasing the output voltage

(B) Improving the regulation

(C) Increasing the current that the regulator can handle

(D) Short-circuit protection

36. The characteristic that allows an isolation amplifier to amplify small signal voltages in the presence of much greater noise voltage is its

(A) CMRR

(B) High gain

(C) High input impedance

(D) Magnetic coupling between input and output

37. When negative feedback is used, the gain bandwidth product of an op-amp

(A) Increases (B) Decreases

(C) Remains same (D) None of the above

38. The SCS differ from the SCR because

(A) It does not have a gate terminal (B) Its holding current is less

(C) It can handle much higher currents (D) It has two gate terminals

39. The PUT is

(A) Much like the UJT

(B) Not a thryristor

(C) Triggered on and off by the gate-to-anode voltage

(D) Not a four-layer device

40. A thyristor has

(A) Two pn junctions (B) Three pn junctions

(C) Four pn junctions (D) Only two terminals

41. An amplifier has the following critical frequencies 1.2 kHz, 950 Hz, 8 kHz & 8.5 kHz. The bandwidth is

(A) 7550 Hz (B) 7300 Hz (C) 6800 Hz (D) 7050 Hz

42. In the step response of a noninverting amplifier, a longer rise time means

(A) A narrower bandwidth (B) A lower critical frequency

(C) A higher upper critical frequency (D) None of the above

43. The gain of a certain amplifier frequency decreases by 6 dB when the frequency is reduced from 1 kHz to 10 Hz. The roll-off is

(A) –3 dB/decade (B) –6 dB/decade

(C) –3 dB/octave (D) –6 dB/octave

44. The midrange voltage gain of a certain amplifier is 100. The input RC circuit has a lower critical frequency of 1 kHz. The actual voltage gain at f = 1 kHz, f = 100 Hz and f = 10 Hz

(A) 70.7, 10, 1 (B) 7.07, 10, 1

(C) 7.07, 50, 25 (D) None of the above

45. Cross over distortion is a problem for

(A) Class A amplifiers (B) Class AB amplifiers

(C) Class B amplifiers (D) All of these amplifiers

46. In a certain common-source amplifer, R_D = 1 kΩ, R_S = 560 Ω, V_{DD} = 10V and g_m = 4500 μS. If the source resistor is completely bypassed the voltage gain is

(A) 450 (B) 45 (C) 4.5 (D) 2.52

47. Ideally, the equivalent circuit of a FET contains

(A) A current source in series with a resistance

(B) A resistance between drain and source terminals

(C) A current source between gate and source terminals

(D) A current source between drain and source terminals

48. A TMOSFET is a special type of

(A) D-MOSFET (B) JFET

(C) E-MOSFET (D) Answers (A) and (C)

49. The decimal number 175 is equal to the binary number

(A) 11001111 (B) 10101110 (C) 10101111 (D) 11101111

50. A pulse is applied to each input of a 2-input NAND gate. One pulse goes HIGH at t = 0 and goes back low at t = 1 ms. The other pulse goes HIGH at t = 0.8 ms and goes back low at t = 3 ms. The output pulse can be described as follows

(A) It goes LOW at t = 0 and back HIGH at t = 3 ms.

(B) It goes LOW at t = 0.8 ms and back HIGH at t = 3 ms.

(C) It goes LOW at t = 0.8 ms and back HIGH at t = 1 ms.

(D) None of the above

51. $\overline{AB + AC} + \bar{A}\bar{B}C$ is equal to

(A) $\bar{A} + \overline{BC}$ (B) $\overline{AB} + \bar{C}$ (C) $\bar{A} + \overline{BC}$ (D) $\bar{A} + \overline{B + C}$

52. On a Karnaugh map, grouping the Os produces

(A) A product-of- sums expressions
(B) A sum-of-products expression
(C) A "don't-care" condition
(D) AND-OR logic

53. The output expression for an AND-OR-Invert circuit having one AND gate with inputs A, B, C and D and one AND gate with inputs E and F is

(A) $ABCD + EF$
(B) $\bar{A} + \bar{B} + \bar{C} + \bar{D} + \bar{E} + \bar{F}$
(C) $\overline{(A + B + C + D)(E + F)}$
(D) $(\bar{A} + \bar{B} + \bar{C} + \bar{D})(\bar{E} + \bar{F})$

54. A BCD-to-7 segment decoder has 0100 on its inputs. The active outputs are

(A) a, c, f, g
(B) b, c, f, g
(C) b, c, e, f
(D) b, d, e, g

55. In general, a multiplexer has

(A) One data input, several data outputs and selection inputs
(B) One data input, one data output, and one selection input
(C) Several data inputs, several data outputs and selection inputs
(D) Several data inputs, one data output and selection inputs

56. The purpose of the clock input to a flip-flop is to

(A) Clear the device
(B) Set the device
(C) Always cause the output to change states
(D) Cause the output to assume a state dependent on the controlling (S-R, J-K or D) inputs

57. Which one of the following is an example of a counter with a truncated modulus?

(A) Modulus 8
(B) Modulus 14
(C) Modulus 16
(D) Modulus 32

58. A 10 MHz clock frequency is applied to a cascaded counter consisting of a modulus-5 counter, a modulus-8 counter and two modulus-10 counters. The lowest output frequency possible is

(A) 10 kHz
(B) 2.5 kHz
(C) 5 kHz
(D) 25 kHz

59. A modulus-10 Johnson counter requires

(A) Ten flip-flops
(B) Four flip-flops
(C) Five flip-flops
(D) Twelve flip-flops

60. With a 100 kHz clock frequency, eight bits can be serially entered into a shift register

(A) 80 µs (B) 8 µs (C) 80 ms (D) 10 µs

61. Optical storage device employs

(A) Ultraviolet light (B) Electromagnetic field

(C) Optical couplers (D) Lasers

62. A ROM is a

(A) Nonvolatile memory (B) Voltaile memory

(C) Read/write memory (D) Byte-organised memory

63. The main advantage of ECL over TTL or CMOS is

(A) ECL is less expensive

(B) ECL consumes less power

(C) ECL is available in a greater variety of circuit types

(D) ECL is faster

64. A positive-going pulse is applied to an inverter. The time interval from the leading edge of the input to the leading edge of the output is 7 ns. This parameter is

(A) Speed-power product (B) Propogation delay, t_{PLH}

(C) Pulse width (D) None of the above

65. OLMC is acronym for

(A) Output Logic Main Cell (B) Optimum Logic Multiple Channel

(C) Output Logic Macrocell (D) Odd-parity Logic Master Check

66. FPGA stands for

(A) Fast propogation gate array (B) Field presettable gate application

(C) Field programmable gate array (D) File programmable gate array

67. A varactor diode exhibits

(A) A variable capacitance that depends on reverse voltage

(B) A variable resistance that depends on reverse voltage

(C) A variable capacitance that depends on forward current

(D) A constant capacitance over a range of reverse voltages

68. The doping of a semiconductor with a p-type dopant creates, in the bandgap,

(A) Filled states near the conduction band

(B) Empty states near the conduction band

(C) Filled states near the valence band

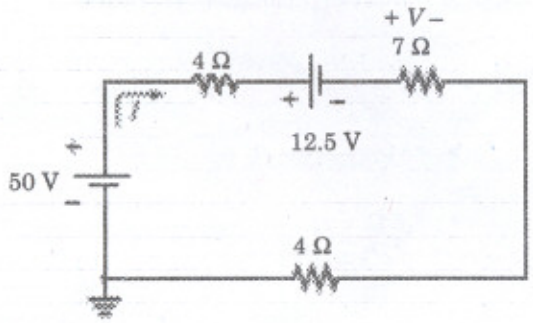
(D) Empty states near the valence band

69. The condition(s) that indicate that a material is superconducting are

(A) Zero resistance (B) Flux exclusion

(C) Zero resistance and flux-exclusion (D) None of the above

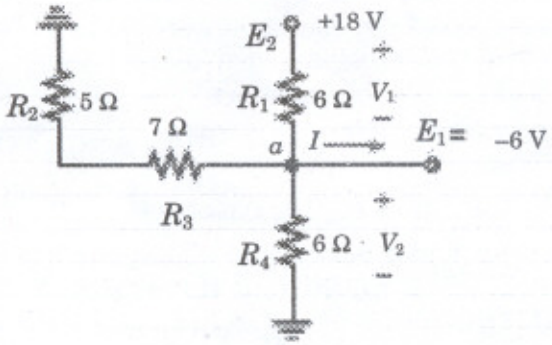
70. The I and voltage across 7 Ω is for the network is



(A) 2.5 A 17.5 V (B) 2 A, 17V

(C) 2.5 V 17 V (D) 2A, 17.5 V

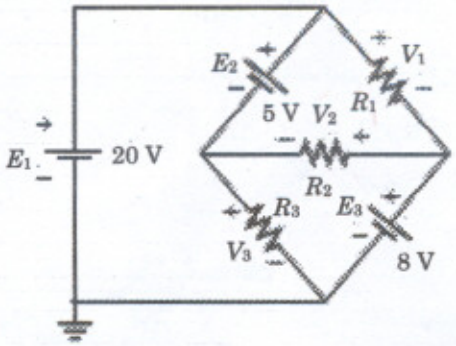
71. The voltage V_1, V_2 and I for the given network are



(A) 6 V, 24 V, 5.5A (B) 24 V, 6 V 5.5 A

(C) 24 V, –6 V, 5.5 A (D) None of the above

72. The voltages V_1, V_2 and V_3 of the network are

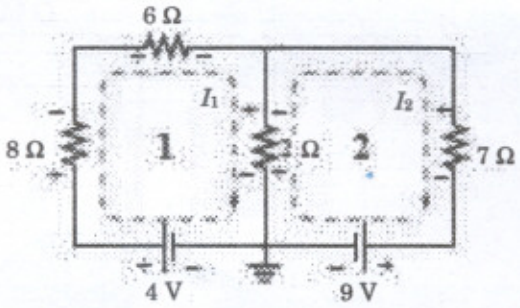


(A) 12 V, 7 V, 15 V
(B) 12 V, –7V, 15V
(C) 12V, 7V, 19 V
(D) None of the above

73. The impedance of the parallel LCR circuit at resonance is

(A) Maximum
(B) Minimum
(C) Average value
(D) None of the above

74. The current through the 7Ω of the network is



(A) 0.097 A
(B) 0.971 A
(C) –0.971 A
(D) None of the above

75. A network configuration typically having a diamond appearance in which no two elements are in series or parallel is known as

(A) Wye network
(B) Ampere's circuit
(C) Bridge network
(D) None of the above

76. The current I in any branch of a network, due to a single voltage source E anywhere else in the network, will equal the current through the branch in which the source was originally located if the source is placed in the branch in which the current I was originally measured

(A) Superposition theorem
(B) Substitution theorem
(C) Milliman's theorem
(D) Reciprocity theorem

77. Shot noise arises in the semiconductor devices due to the

(A) The random diffusion of minority carriers

(B) The random generation and recombination of hole-electron pairs

(C) Answers (A) and (B)

(D) None of the above

78. The advantage of using a junction diode as temperature stabilizing element in transistor amplifier is

(A) Its temperature coefficient of resistance is negative

(B) It is made of the same material as the transistor

(C) Its reverse current is low

(D) Its resistance changes with change in temperature

79. Which of the following is not a characteristic of UJT?

(A) Intrinsic standoff ratio

(B) Negative resistance

(C) Peak-point voltage

(D) Bilateral conduction

80. A ferromagnetic core if placed inside a coil

(A) Will decrease the coil inductance

(B) Will raise the resistance of the coil

(C) Will lower the resistance of the coil

(D) Will increase the coil inductance

81. A better power supply should possess

(A) Higher input impedance

(B) Lower output impedance

(C) Lower input impedance

(D) Total voltage regulation

82. A radio wave has a maximum electric field intensity 10^{-4} Vm^{-1} on arrival at a receiving antenna. The maximum flux density of such a wave is

(A) Zero

(B) 3×10^{4} T

(C) 5.8×10^{-9} T

(D) 3.3×10^{-13} T

83. In the case of reflection and refraction of light at the dielectric interface

(A) Tangetial components of $\overline{D}$ and $\overline{B}$ are continuous

(B) Tangetial components of $\overline{D}$ and normal component of $\overline{B}$ are continuous

(C) Normal components of $\overline{D}$ and $\overline{B}$ are continuous

(D) Normal components of $\overline{D}$ and tangential components of $\overline{B}$ are continuous

84. The Poynting theorem is a mathematical statement of the conservation of

(A) Momentum (B) Charge

(C) Electromagnetic theory (D) States

85. The electromagnetic theory suggests that the electric vector in the wave suffers a sudden phase change of π on reflection from the plane reflecting surface but the magnetic vector suffers

(A) A phase change of π (B) A phase change of 2π

(C) A phase change of $\pi/2$ (D) No phase change

86. An infinitely long hollow cylinder of radius R carrying a surface charge density σ is rotated about its cylindrical axis with a constant angular speed ω. The magnitude of the surface current is

(A) $\sigma R\omega$ (B) $2\sigma R\omega$ (C) $\pi\sigma R\omega$ (D) $2\pi\sigma R\omega$

87. The force which is always directed away or towards a fixed centre and magnitude of which is a function only of the distance from the fixed centre, known as

(A) Coriolis force (B) Centripetal force

(C) Centrifugal force (D) Central force

88. Equation of motion for bead sliding on a uniformly rotating wire in a force free space is

(A) $\ddot{r} = r\omega^2$ (B) $\ddot{\theta} + \frac{mg\ell\theta}{\ell} = 0$

(C) $\ddot{\theta} + \frac{g\theta}{\ell} = 0$ (D) None of the above

89. A cube has side L_o when at rest. If the cube moves with velocity v parallel to its one edge then its volume becomes

(A) L_o^3 (B) $L_o^3\left(1 - \frac{v^2}{c^2}\right)^{-1/2}$

(C) $L_o^3\left(1 - \frac{v^2}{c^2}\right)$ (D) $L_o^3\left(1 - \frac{v^2}{c^2}\right)^{1/2}$

90. The unit of Hall coefficient is

(A) $V\ m^3\ A\ wb^{-1}$ (B) $V\ m\ A\ wb^{-1}$

(C) $Vm^3\ A^{-1}\ wb^{-1}$ (D) $V\ m^2\ A^{-2}\ wb$

91. If a body is thrown vertically upwards, it strikes the ground at

(A) $\frac{16}{3}\omega h \cos\emptyset\left(\frac{2h}{g}\right)^{1/2}$ to the west

(B) $\frac{16}{3}\omega h \cos\emptyset\left(\frac{2h}{g}\right)^{1/2}$ to the east

(C) $\frac{2}{3}\omega h \cos\emptyset\left(\frac{2h}{g}\right)^{1/2}$ to the west

(D) $\frac{2}{3}\omega h \cos\emptyset\left(\frac{2h}{g}\right)^{1/2}$ to the east

92. Alogrithm and flow chart are both

(A) Different procedures

(B) The same procedures

(C) Different ways show the same procedure

(D) All three are correct

93. In algorithm in all steps

(A) Different activities takes place

(B) Same activity is repeated

(C) Same activity is shown by different methods

(D) Activity is started

94. In 8085, when the operand is specified within the instruction itself, the addressing mode is

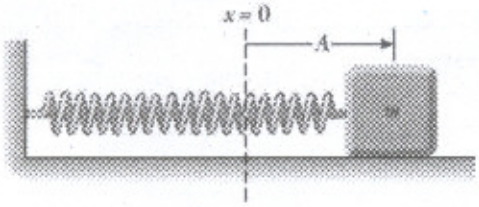
(A) Direct addressing

(B) Indirect addressing

(C) Indexed addressing

(D) Immediate addressing

95. A block with a mass of 200 g is connected to a light spring for which the force constant is 5.00 N/m and is free to oscillate on a horizontal, frictionless surface. The block is displaced 5.00 cm from equilibrium and released from rest, as shown in figure. The acceleration of the mass is given by



(A) $a = (-1.25\,\mathrm{m/s^2})\cos(5t)$

(B) $a = (1.25\,\mathrm{m/s^2})\cos(5t)$

(C) $a = (-1.25\,\mathrm{m/s^2})\sin(5t)$

(D) $a = (0.05\,\mathrm{m/s^2})\cos(5t)$

96. A transverse wave is represented by the equation $y=y_0 \sin[(2\pi/\lambda)(vt-x)]$. For what value of λ is the particle velocity equal to two times the wave velocity?

(A) $\lambda = 2\pi y_0$ (B) $\lambda = \pi y_0/3$

(C) $\lambda = \pi y_0/2$ (D) $\lambda = \pi y_0$

97. A massless spring of force constant k has masses m_1 and m_2 attached to its two ends. The system rests on a horizontal table. The angular vibrational frequency ω of this system is

(A) $\left[\frac{k}{m_1 - m_2}\right]^{1/2}$ (B) $\left[\frac{k}{m_1 + m_2}\right]^{1/2}$

(C) $\left[\frac{k(m_1+m_2)}{m_1 m_2}\right]^{1/2}$ (D) $\left[k\left(\frac{1}{m_1} - \frac{1}{m_2}\right)\right]^{1/2}$

98. An open vessel containing water is given a constant acceleration a in the horizontal direction, then the free surface of water gets sloped with the horizontal at an angle θ given by

(A) $\theta = \tan^{-1}(a/g)$ (B) $\theta = \tan^{-1}(g/a)$

(C) $\theta = \sin^{-1}(a/g)$ (D) $\theta = \cos^{-1}(a/g)$

99. An uniform line charge distribution with linear charge density of 3.30 nano Coulombs per meter is located at x = 3 meters and y = 4 meters. The electric field strength at origin is thus :

(A) $-7.13\,i - 9.50\,j$ V/m (B) 7.13 I – 9.50 j V/m

(C) 7.13 I + 9.50 j V/m (D) – 7.13 I + 9.50 j V/m

100. Which of the following statements is false about the differences between 8086 and 8085 microprocessors?

(A) Each instruction is fetched, decoded and executed before processing of next instruction in 8085; whereas, in 8086, while one instruction is executed, the fetching and deoding of succeeding instructions concurrently takes place

(B) 8086 has 116 bit data bus while 8085 has a 8-bit data bus

(C) 8086 stack pointer is a 20 bit register while 8085 stack pointer is a 16-bit register

(D) 8086 has a 20 bit bus for physical addressing while 8085 has a 16 bit address bus