TEST BOOKLET

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Test Booklet Series

B

Serial No. 908174

BAC-36

ELECTRICAL ENGINEERING

Time Allowed : 2 Hours **Maximum Marks : 300**

INSTRUCTIONS TO CANDIDATE

1. IMMEDIATELY AFTER THE COMMENCEMENT OF THE EXAMINATION, YOU SHOULD CHECK THAT THIS TEST BOOKLET DOES NOT HAVE ANY UNPRINTED OR TORN OR MISSING PAGES OR ITEMS ETC. IF SO, GET IT REPLACED BY A COMPLETE TEST BOOKLET.
2. ENCODE YOUR OPTIONAL SUBJECT CODE AS MENTIONED ON THE BODY OF YOUR ADMISSION CERTIFICATE AND ADVERTISEMENT AT APPROPRIATE PLACES ON THE ANSWER SHEET.
3. ENCODE CLEARLY THE TEST BOOKLET SERIES A, B, C OR D AS THE CASE MAY BE IN THE APPROPRIATE PLACES IN THE ANSWER SHEET USING HB PENCIL.
4. You have to enter your Roll No. on the Test Booklet in the Box provided along side. DO NOT write anything else on the Test Booklet.
5. This Test Booklet contains 120 items (questions). Each item comprises four responses (answers). You will select the response which you want to mark on the Answer Sheet. In case you feel that there is more than one correct response, mark the response which you consider the best. In any case, choose **ONLY ONE** response for each item.
6. You have to mark all your responses **ONLY** on the separate Answer Sheet provided by using HB pencil. See instruction in the Answer Sheet.
7. All items carry equal marks. All items are compulsory. Your total marks will depend only on the number of correct responses marked by you in the Answer Sheet. For each question for which a wrong answer is given by you, **one fifth (0.20) of the marks assigned to that question will be deducted as penalty.**
8. Before you proceed to mark in the Answer Sheet the responses to various items in the Test Booklet, you have to fill in some particulars in the Answer Sheet as per instructions sent to you with your **Admission Certificate.**
9. After you have completed filling in all your responses on the Answer Sheet and the examination has concluded, you should hand over to the Invigilator the Answer Sheet, the Test Booklet issued to you.

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1. The structure of a multi–layered integrated circuit is determined by

   (a) Removing successive layers of the circuit.

   (b) The intensity of backscattered or secondary electrons is detected by first or second detector.

   (c) Surface of the integrated circuit is a flat layer of semiconductor substrate material having implanted doped areas, the surface is covered with a metallisation layer providing a Schottky barrier.

   (d) All 3 of above.

2. The Laplace transform of $f(t) = 7\ e^{-3t}\ \text{Cos}\ (4t)\ u(t)$ is

   (a) $3/(s + 7) + (4)^2$

   (b) $7\ (s + 3) / (s + 3)^2 + 16$

   (c) $4\ (s + 3) / (s + 7)$

   (d) $7\ (s + 4) / (s + 3)^2$

3. For a difference equation $c(k + 1) + \frac{1}{2} c\ (k) = r\ (k)$; $c(0) = 0$, the system's impulse response $c(z)$ is

   (a) $z^{-1} / 1 + 0.5\ z^{-1}$ (b) $z/1 + z$

   (c) $1/ 2 + z$ (d) $2/1 + z^{-1}$

4. According to the sampling theorem, the critical sampling period T is related with maximum frequency f_m as

   (a) $T = 1/f_m$ (b) $T = 2\ f_m$

   (c) $T = 1/2\ f_m$ (d) $T = f_m/2$

5. A system is said to be causal if

   (a) the system has right half poles.

   (b) the region of convergence include unit circle.

   (c) the region of convergence outside the unit circle.

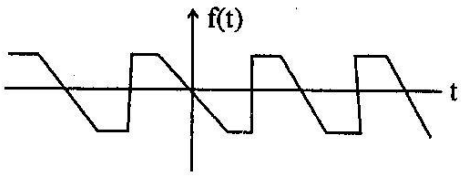
   (d) the system has proper rational function.

6. The inverse z–transform of $Y(z) = \dfrac{5}{1 - 0.2\ z^{-1}}$ is

   (a) $y(k) = 5\ (0.2)^k$ (b) $y(k) = 0.2\ (5)^k$

   (c) $y(k) = (5)^k + 0.2$ (d) $y(k) = 0.2\ (k + 5)$

7. The waveform shown has



(a) Even symmetry (b) Halfwave symmetry
(c) Odd symmetry (d) No symmetry

8. The average value of a signal

$f(t) = 2 + 3 \cos (10\pi t + 30°) + 4 \cos (20 \pi t + 60°)$ is

(a) 9 (b) 7
(c) 5 (d) 2

9. If $f_1(t) \leftrightarrow F_1(w)$ and $f_2(t) \leftrightarrow F_2(w)$ then

$f_1(t)\, f_2(t) \leftrightarrow \frac{1}{2\pi} [F_1(w) * F_2(w)]$. This is the property of Fourier transform as

(a) Time shifting (b) Frequency shifting
(c) Frequency convolution (d) Time convolution

10. What are the time constants of the following systems ?

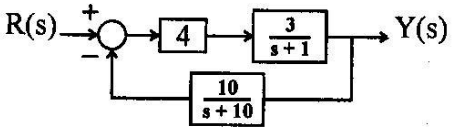
$G_1(s) = \frac{2}{0.4\,s + 1}$, $G_2(s) = \frac{8}{5s + 2}$

(a) 0.4, 5 (b) 5, 1.6
(c) 0.4, 2.5 (d) 0.4, 4

11. Given $E(s) = \frac{6}{s^2 + 3s + 4} R(s)$. What is e_{ss} if the input signal is a step input of magnitude 2 ?

(a) 3 (b) 6
(c) 1.5 (d) 2

12. The poles of given closed loop system are



(a) real (b) complex
(c) on imaginary axis (d) at origin

13. Which of these descriptions is true of the step response of an overdamped system ?

(a) it rises to a steady state value with no overshoot

(b) it rises to a steady state value with little overshoot

(c) it has an undershoot

(d) it does not settle to a steady state value

14. Which statement is true for given system ?

$$G_1(s) = \frac{1}{2s^2 + 3s + 1}, \quad G_2(s) = \frac{1}{s^2 + 0.8s + 1}$$

(a) G_1 and G_2 are unstable

(b) G_1 and G_2 are under damped

(c) G_1 has steady state error but G_2 has no error

(d) G_1 settles faster than G_2

15. The root locus for $G(s) = 1/s^2$ is

(a) a horizontal straight line on the real axis.

(b) a vertical straight line passing through (–1, 0)

(c) a vertical straight line passing through (1, 0)

(d) a vertical straight line passing through (0, 0)

16. The transfer function $G(s) = 1/(0.01\ s + 1)$ is

(a) a lag term

(b) a lead term

(c) a term providing high frequency amplification

(d) none of the above

17. For an Octal decimal number conversion $(x)_{10} = (327)_8$, the value of x is

(a) 125 (b) 215

(c) 315 (d) 205

18. Which addressing mode is represented by 8085 instruction LDA addr ?

(a) Indirect (b) Immediate

(c) Absolute (d) Register

19. The 8085 microprocessor has a non–maskable interrupt as

(a) RST 5.5 (b) RST 7.5

(c) INTR (d) TRAP

20. Program status word of 8085 microprocessor consists of number of flags as

(a) 3 (b) 2

(c) 5 (d) 1

21. The stack pointer in a microprocessor is used

(a) to address the stack position of RAM

(b) to address the instruction

(c) to contain the status of accumulator

(d) to contain recoded opcode

22. The B–register in 8751 micro controller is used

(a) as timer register

(b) specially for multiply and divide operations

(c) as control register

(d) as PSW register

23. The ALU can perform the function

(a) Add with or without carry (b) AND, OR, XOR

(c) Bit complement (d) All the above

24. The LVDT is used for the measurement of

(a) voltage (b) force

(c) pressure (d) displacement

25. A milliameter of 3 Ω resistance reads a maximum current of 150 mA. It can be used as a voltmeter to read upto 15 V by

(a) connecting a resistance of 100 Ω in parallel with meter

(b) connecting a resistance of 57 Ω in parallel with meter

(c) connecting a resistance of 150 Ω in series with meter

(d) connecting a resistance of 97 Ω in series with meter

26. The deflecting torque of a moving coil instrument depends on

(a) supply frequency
(b) inverse of area of coil
(c) flux in the coil
(d) square of the voltage

27. Which transducer has very nonlinear and high temperature co–efficient characteristics ?

(a) thermistor
(b) thermocouple
(c) pyrometer
(d) thermometer

28. Lissajons figures asppear on CRO screen

(a) when two sine waves of same frequency are applied depend on amplitude of two input signals.
(b) depend on amplitude of two input signals.
(c) depend on phase of two input signals.
(d) used to measure harmonics.

29. The Q–meter is an instrument

(a) to measure inductance
(b) to measure capacitance
(c) to measure ratio of reactance to resistance
(d) to measure frequency

30. Which is not measured by frequency meter ?

(a) time period
(b) frequency
(c) phase
(d) ratio of frequencies

31. The fast Fourier transform (FFT) analysis can be measured using

(a) distortion meter
(b) spectrum analyser
(c) power meter
(d) data acquisition system

32. In a full bridge rectifier circuit, with rectifier on the secondary of the transformer, the dc output voltage is

(a) $2V_{sec(peak)}/3.14$
(b) $V_{sec(peak)}/3.14$
(c) $2V_{sec(peak)}$
(d) $3.14V_{sec(peak)}$

33. In a clipper circuit with silicon diode and bias of V volts, the clipping level is

(a) 0.7 V (b) V + 0.7

(c) V (d) 2V + 0.7

34. A 6V zener diode is used to provide voltage regulation with a series resistance of 100 Ohms and supply voltage is 12V. When under no load the power dissipated in the zener diode is

(a) 60mW (b) 36mW

(c) 360mW (d) 3600mW

35. In a transistor biasing circuit with voltage divider bias circuit, if the operating point is on the left on the load line.

(a) peak of the input voltage is clipped.

(b) one side peak of the output voltage is clipped.

(c) both positive and negative peaks are clipped.

(d) there will be a distortion in the middle.

36. In a differential amplifier the differential voltage gain is 500 and the common mode voltage gain is 0.5. The CMRR in dB is

(a) 80 (b) 60

(c) 30 (d) 20

37. In a bipolar transistor when in saturation, the dc current gain is

(a) less than β (b) greater than β

(c) equal to β (d) zero

38. An OP amp has an open loop gain of 1,00,000. If the feedback fraction is 0.02, the approximate closed loop gain is

(a) 1 (b) 1,00,000

(c) 50 (d) 0.02

39. An OP amp has a slew rate of 1V/μs. At a signal frequency of 0.1 MHz, the maximum undistorted sine wave amplitude is

(a) 8V (b) 4.82 V

(c) 2.02 V (d) 1.592 V

40. In a Butter worth second order low pass filter with $R_1 = R_2 = 1$Kohms, $C_1 = C_2 = 0.001$F, the cut off frequency is

(a) 1KHz (b) 100KHz

(c) 0.157Hz (d) 1.57Hz

41. If 2 variables A and B are given to a 2 input NOR gate, the output is equivalente to

(a) $A + B$ (b) $A' \cdot B'$

(c) $A' + B$ (d) $A \cdot B$

42. The sum of product expression for a Boolean function can be derived from its truth table by

(a) AND operation of the product terms.

(b) NOR operation of the product terms.

(c) OR operation of the product terms.

(d) NAND operation of the product terms.

43. IN TTL Ics the protective diode is used to limit the

(a) positive excursion to 0.7V

(b) negative excursion to –0.7V

(c) positive excursion to 0.3 V

(d) negative excursion to –0.3 V

44. A full adder is a combinational circuit that performs the arithmetic sum of three input bits and produces a

(a) sum output (b) sum output and a carry

(c) sum output with two carries (d) two sums with two carries

45. A 1 to 16 demultiplexer has

(a) 2 select inputs (b) 3 select inputs

(c) 4 select inputs, (d) 8 select inputs

46. To convert a S–R flip–flop to D flip–flop

(a) D input is given to S and D input to clock

(b) D input is given to S and D to R

(c) D input is given to clock and D to S input

(d) D input to S and clock to R

47. A modulo–6 ripple counter with J–K flip-flops uses at the clear input, the output from

(a) NAND gate with Q_B,Q_C as inputs

(b) NAND gate with Q_A, Q_B as inputs

(c) NAND gate with Q_A, Q_C as inputs

(d) AND gate with Q_B, Q_C as inputs

48. In a 32×8 ROM there are

(a) 8 address lines (b) 5 address lines

(c) 4 address lines (d) 32 address lines

49. A binary ladder with R–2R network has R = 20K Ohms. The total resistance looking out toward the LSB input is

(a) 20KOhms (b) 40KOhms

(c) 10KOhms (d) 30KOhms

50. A rectangular waveform has fifth harmonic amplitude

(a) same as that of fundamental

(b) 0.2 times that of fundamental

(c) 0.4 times that of fundamental

(d) 5 times that of fundamental

51. A amplitude modulated wave has E_{max} of 10V and E_{min} of 5V. The modulation index is

(a) 3 (b) 1/3

(c) 1 (d) 2

52. In FM demodulation hard limiter and band pass filter are used to remove

(a) frequency variation in the FM wave

(b) amplitude variation in FM wave

(c) noise in the demodulated wave

(d) amplitude variations in demodulated wave

53. Digital modulation can withstand channel noise and distortion better than analog schemes
    (a) as long as the channel noise is within limits
    (b) for any noise
    (c) for thermal noise only
    (d) statement is not true

54. In pulse code modulation the effect of quantization is to
    (a) remove noise
    (b) introduce additional noise
    (c) limit noise in the channel
    (d) remove noise in the limiter

55. In phase shift keying the power required is
    (a) 3dB more than in ASK
    (b) 3dB less than in ASK
    (c) 6dB less than in ASK
    (d) 6dB more than in ASK

56. The cumulative distribution function has a maximum value of
    (a) 2 (b) unity
    (c) 1.5 (d) –1

57. In digital modulation, if the phase in the received RF pulse is unknown
    (a) coherent detection can be used
    (b) coherent detection cannot be used
    (c) envelope detection cannot be used
    (d) non coherent techniques cannot be used

58. In some of the channel coding schemes such as in NRZ, with long strings of 1's or 0's
    (a) information is gained
    (b) synchronization may be lost
    (c) synchronization is achieved
    (d) all the information is lost

59. Attitude control in satellites is necessary for pointing to the desired regions on earth

(a) the power supplies

(b) the amplifiers

(c) the directional antennas aboard

(d) the motors

60. In cellular scheme, the frequency reuse is done in all the cells

(a) adjacent to the cell

(b) except in those immediately adjacent cells

(c) within a city

(d) having low power transmitters

61. In television receiver a dc restorer is used before applying the signal to

(a) speaker (b) picture tube

(c) audio amplifier (d) IF amplifier

62. The core of a transformer (medium size) uses to provide high flux densities

(a) diamagnetic (b) paramagnetic

(c) ferromagnetic core (d) none of these

63. Laminations in the transformer core are provided to avoid

(a) continuous air gap (b) to reduce the weight

(c) to reduce exiting current (d) to reduce copper losses

64. A three phase transformer can be used in emergency at reduced rating of 58% to deliver three phase power when it is connected

(a) in star–delta (b) delta–star

(c) star–star (d) delta–delta

65. In a d.c. machine the force on a conductor placed on the periphery of the conductor is

(a) directly proportional to parallel path

(b) inversely proportional to the parallel path

(c) inversely proportional to the length of the conductor

(d) none of these

66. The large d.c. motors used in steel rolling mills are always provided with compensating windings for

(a) opposing the armature mmf
(b) maintaining the voltage
(c) maintaining the speed
(d) none of these

67. In an induction motor high rotor resistance is required for

(a) Power factor and low starting current
(b) high power factor and high starting current
(c) high power factor and low starting current
(d) low slip and high efficiency

68. A synchronous motor at no load condition is known as synchronous condenser and improves the

(a) stability
(b) efficiency
(c) power factor
(d) frequency of the integrated system

69. Hunting is highly undesirable in synchronous machines and to minimize hunting we can use

(a) Damper bars
(b) reduce air gap
(c) use salient poles
(d) use inter poles

70. Linear synchronous motors are used in

(a) Low speed vehicles
(b) high speed vehicles
(c) medium speed vehicles
(d) none of these

71. Brushless D.C. motors arc used in

(a) robotics
(b) refrigerators
(c) airconditioners
(d) centrifuges

72. Single phase series motors are widely used in domestic appliances and operate at speeds

(a) 500 to 1000 rpm
(b) 1500 to 10,000 rpm
(c) 15,000 to 20,000 rpm
(d) 50 to 100 rpm

73. A type of conductor known as expanded ACSR has a filler separating inner steel strands from outer aluminium strands and this filler is

(a) mica sheet (b) cotton tape

(c) paper tape (d) aluminium foil

74. If the diameter of the current carrying conductor increases then the corona loss

(a) increases (b) decreases

(c) remains unchanged (d) none of these

75. Transposition of communication and power lines reduces the induced voltages due to electrostatic and electromagnetic induction to a considerable extent. The lines shall be transposed to _____ of the length in one barrel.

(a) 1/4 (b) 1/5

(c) 1/6 (d) 1/3

76. In river crossing, hilly terrain, modern HV lines have span more than

(a) 50 m (b) 100 m

(c) 500 m (d) 800 m

77. One of the most powerful tool for dealing with unbalanced polyphase circuit is the method of symmetrical components introduced by the scientist

(a) Gauss (b) Volta

(c) Newton (d) C.L. Fortescue

78. Surge impedance loading (SIL) of power transmission line is the power delivered to a purely

(a) inductive

(b) capacitive

(c) resistive load equal to surge impedance

(d) none of these

79. If the transmission line is loaded with leading reactive volt amperes, there will be rise of voltage at the receiving end and this

(a) increases

(b) decreases

(c) remains same with the increase in the length of line

(d) none of these

80. The rate of rise of transient recovery voltage (TRV) depends upon the circuit

(a) power factor (b) voltage

(c) frequency (d) breaking current

81. Plug Setting Multiplier (PSM) is the ratio of

(a) secondary current/relay current

(b) secondary current/primary current

(c) secondary current/relay current setting

(d) none of these

82. Merz–Price protection is used for protection of

(a) transmission line (b) transformer

(c) generator (d) none of these

83. SCR turns off whenever

(a) the supply voltage becomes zero

(b) the gate current becomes zero

(c) the anode current becomes less than the holding current

(d) the anode current is less than latching current

84. The voltage snubber circuit are used

(a) to protect the device from high voltage spikes

(b) to prevent unwanted triggering of power semiconductor devices

(c) for triggering of thyristors without gate triggering

(d) both (a) and (b)

85. The second break down in power BJT occurs due to

(a) The first break down and the formation of hot spot inside

(b) excessive collector current and low collector emitter voltage

(c) excessive base current and high collector emitter voltage

(d) none of thee above

86. The requirement of the gate drive circuits for power MOSFET and IGBT is

(a) high source capability (b) high sink capability

(c) both (a) and (b) (d) high voltage capability

87. For high inductive load of a single phase ac–to–dc full converter, THD of the line current is

(a) 90.9% for the switching angle $\alpha \leq 90°$

(b) 50% for $\alpha \geq 90°$

(c) 48.3% for any value of α

(d) 24.3% for any value of α

88. In an isolated output dc–to–dc fly back converter, the high frequency transformer used works as an inductor

(a) during turn–on period of the switching device

(b) during turn off period of the switching device

(c) during both

(d) none of these

89. A motor load system is stable when the slope of the torque speed characteristics of the motor is

(a) higher than the slope of the torque speed characteristics of the load

(b) lower than the slope of the torque speed characteristics of the load

(c) zero

(d) none of the above

90. Voltage control method employed for speed control of induction motors is most effective for

(a) A constant torque load only (b) fan type load only

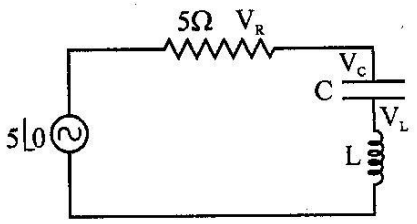
(c) for traction load only (d) none of the above

91. For a closed loop controlled d.c. drive, current limit control (CLC) is normally employed

(a) for speed control (b) at starting

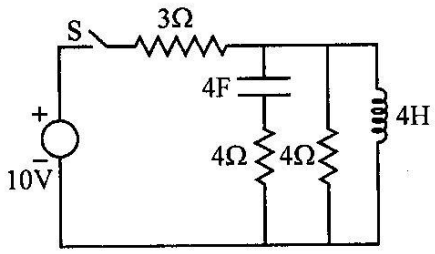
(c) for acceleration (d) both (b) and (c)

92. In the circuit shown below, the magnitudes of V_1 and V_c are twice that of V_r. The inductance of the coil is



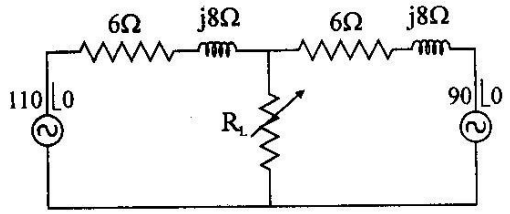
(a) 2.14 mH
(b) 5.30 mH
(c) 3.18 mH
(d) 1.32 mH

93. In the circuit shown below, the switch S is closed at time t = 0. The voltage across the inductance at t = 0+ is



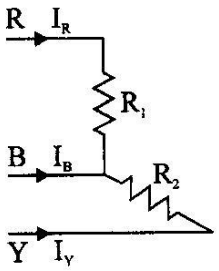
(a) 2V
(b) 4V
(c) –6V
(d) 8V

94. Two AC sources feed a common variable resistive load as shown below. Under the maximum transfer condition, the power absorbed by the load resistance R_1 is



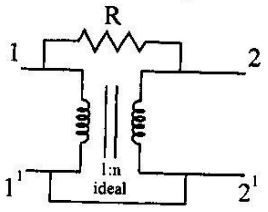
(a) 2200 W
(b) 1250 W
(c) 1000 W
(d) 625 W

95. For three–phase circuit show below the ratio of currents $I_R:I_Y:I_B$ is given by



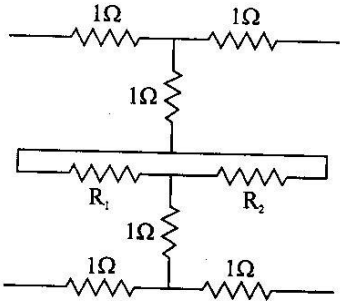
(a) $1:1:\sqrt{3}$
(b) $1:1:2$
(c) $1:1:0$
(d) $1:1:\sqrt{3/2}$

96. Find Z_{22} of the circuit shown below with dot sign at the top side of two windings



(a) $R/n^2 - 1$
(b) $nR/n^2 - 1$
(c) $n^2 R/n^2 - 1$
(d) none

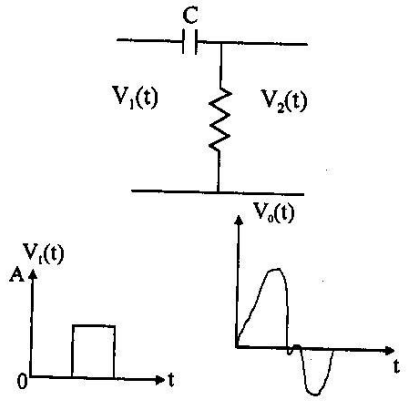
97. For the circuit shown in below, identify the correct statement, where Z_a is z–parameters of top circuit, Z_b is Z parameters of bottom circuit and Z is Z parameters of complete circuit.



(a) For any value of R_1 and R_2 $Z = Z_a + Z_b$
(b) If $R_1 = R_2 = 0$ then only $Z = Z_a + Z_b$
(c) If R_1 and R_2 is equal to 1Ω then only $Z = Z_a + Z_b$
(d) None

98. Consider the following statements regarding an RC differentiating network shown below :
1. For an applied rectangular pulse, the output is spiky in nature for RC << pulse duration.
2. The output is a ramp for rectangular input pulse.
3. The output has zero average value for all inputs

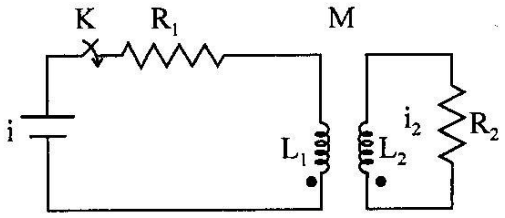
Of these statements



(a) 1, 2, 3 are correct
(b) 1 & 3 are correct
(c) 2 & 3 are correct
(d) 1 & 2 are correct

99. In the circuit shown below, switch is closed at t = 0 with the circuit previously unenergized. The circuit constants are $L_1 = 1H$, $L_2 = 4H$, $R_1 = R_2 = 1\Omega$, $V = 1V$.

The expression for $i_1(t)$ is



(a) $(-2/5)e^{-t/5}$ (b) $1-(2/5)e^{-t/5}$

(c) $1-(1/5)e^{-t/5}$ (d) $(-1/5)e^{-t/5}$

100. Using Gauss law in integral form, electric field due to the following volume charge distribution in Cartesian :

$$\delta = \begin{cases} |z| & |z| < a \\ 0 & |z| > a \end{cases}$$

(a) $z^3/2\varepsilon_0|z|\, i_z$, for $|z| < a$, $a^2\,|z|/2\varepsilon_0 z\, i_z$ for $|z| > a$

(b) $z^2/2\varepsilon_0|z|\, i_z$, for $|z| < a$, $a^2\,|z|/2\varepsilon_0 z\, i_z$ for $|z| > a$

(c) $|z^3|/2\varepsilon_0 z\, i_z$, for $|z| < a$, $a^2\,|z|/2\varepsilon_0 z\, i_z$ for $|z| > a$

(d) $z^3/2\varepsilon_0|z|\, i_z$, for $|z| < a$, $a^2\, z/2\varepsilon_0 z\, i_z$ for $|z| > a$

101. A filamentary wire closely wound in the form of a spiral in the *xy* plane, starting at the origin and ending at radius 'a', carries a current I in ϕ direction. Consider the turn density 'n' to be an arbitrary function of 'r' and show that magnetic flux density at a point (0, 0, z) is given by

(a) $B = \mu_0 I/2 \int_{r=0}^{a} nr^2\, dr/(r^2 + z^2)^{3/2}\, i_z$ & $m = \Pi I(\int_{n=0}^{a} nr^2\, dr) i_z$

(b) $B = \mu_0 I/2 \int_{r=0}^{a} nr^2\, dr/(r^2 + z^2)^{3/2}\, i_z$ & $m = \Pi I(\int_{n=0}^{a} nr\, dr) i_z$

(c) $B = \mu_0 I/2 \int_{r=0}^{a} nr\, dr/(r^2 + z^2)^{3/2}\, i_z$ & $m = \Pi I(\int_{n=0}^{a} nr^2\, dr) i_z$

(d) $B = \mu_0 I/2 \,(\int_{r=0}^{a} nr^3\, dr/(r^2 + z^2)^{3/2})\, i_z$ & $m = \Pi\,(I\int_{n=0}^{a} nr^2\, dr) i_z$

102. Electric and magnetic fields are given in cylindrical co–ordinates by

$$E = \begin{cases} V_0/\, r\ln(b/a)\ \cos\beta z\ \cos\omega t\ i_r & a < r < b \\ 0 & \text{otherise} \end{cases}$$

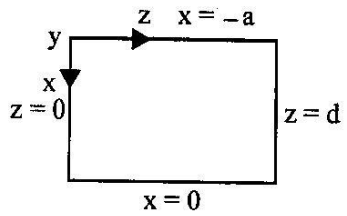
$$B = \begin{cases} \mu_0 I_0/2\Pi r\ \sin\beta z\ \sin\omega t\ i_\phi & a < r < b \\ 0 & \text{otherise} \end{cases}$$

Where V_0, I_0, ω and $\beta = \omega\sqrt{\mu_0\,\varepsilon_0}$ are constants. Find the expression for the power leaving the volume bounded b two constant z planes, one of which is the z = 0 plane,

(a) $V_0I_0/2\ \sin2\beta z$ (b) $V_0I_0/4\ \sin2\beta z$

(c) $V_0I_0/6\ \sin2\beta z$ (d) $V_0I_0/8\ \sin2\beta z$

103. A resonator is formed by placing perfect conductors in two transverse planes z = 0 and z = d of a parallel plate wave-guide of spacing 'a'. Find the resonant frequency corresponding to TEM, o, l modes



(a) $f_{m,o,l} = 1/2\sqrt{\mu\varepsilon}\sqrt{(m/a)^2 + \sqrt{(1/d)^2}}$

(b) $f_{m,o,l} = 1/2\sqrt{\mu\varepsilon}\sqrt{(m/a)^2 + \sqrt{(1/d)^2}}$

(c) $f_{m,o,l} = 1/2\sqrt{\mu\varepsilon}\sqrt{(m/a)^3 + \sqrt{(1/d)^3}}$

(d) $f_{m,o,l} = 1/2\sqrt{\mu\varepsilon}\sqrt{(m/a)^3 + \sqrt{(1/d)^3}}$

104. A cavity resonator with an open end functions as a

(a) unidirectional antenna, sending or receiving RF energy to/from the direction of the open end.

(b) bi-directional antenna, sending or receiving RF energy to/from the direction of the open end.

(c) unidirectional antenna, sending or receiving EM waves to/from the direction of the open end.

(d) bi-directional antenna, sending or receiving EM waves to/from the direction of the open end.

105. Which of the following statements is true ?

(1) At resonance, the series impedance of the two elements is at a minimum and the parallel impedance is a maximum.

(2) At resonance, the series impedance of the two elements is at a maximum and the parallel impedance is a minimum.

(3) At resonance, the series impedance of the two elements is at a minimum and the parallel impedance is a minimum.

(4) At resonance, the series impedance of the two elements is at a maximum and the parallel impedance is a maximum.

(a) Only 1 is correct (b) 1 and 2 are correct

(c) 3 and 4 are correct (d) Only 2 is correct

106. Which of the following statements is true ?

1. Polarization is the orientation of the fields where the electric field is oriented along the axis of the antenna and the magnetic field is perpendicular to both the electric field and the direction of propagation.

2. Polarization is the orientation of the fields where the magnetic field is oriented along the axis of the antenna and the electric field is perpendicular to both the electric field and the direction of propagation.

3. Polarization is the orientation of the fields where the magnetic field is oriented along the axis of the antenna and the electric field is perpendicular to both the magnetic field and the direction of propagation.

(a) only 1 is correct (b) only 2 is correct

(c) only 3 is correct (d) none

107. The electric break–down strength of materials is dependent on

(1) Composition (2) Thickness

(3) Moisture content (4) All the above

(a) 1 is correct (b) 1 and 2 are correct

(c) 2 and 3 are correct (d) only 4 is correct

108. Materials having a high dielectric constant, which is non–linear are known as

(a) Super dielectrics (b) Elastomers

(c) Ferromagnetics (d) Hard dielectrics

109. The dielectric strength of ferromagnetic materials depends to a large extent on

(a) Intensity of electric field

(b) Presence of magnetic materials in vicinity

(c) Area of hysterisis loop for materials

(d) Frequency of applied voltage

110. Piezo–electric materials serve as a source of

(a) Microwaves (b) Ultrasonic waves

(c) Musical waves (d) Resonant

111. Piezo–electricity provides with a means of converting

(a) Electrical to Mechanical (b) Mechanical to Electrical

(c) Electrical to Magnetic (d) Magnetic to Electrical

112. Magnetic materials used in Hard disc, Floppy disc are

(a) NiCo, CuNiFe, CrO_2, Fe_2O_3

(b) NiCo, CNiFe, CrO_2, Fe_2O_3

(c) NiCu, CuNiFe, CrO_2, Fe_2O_3

(d) NiCo, CuNiFe, CrO_2, Fe_2O_2

113. $SmCo_5$, Sm_2Co_{17}, NdFeB(= $Nd_2Fe_{14}B$) can be used in

(a) Videotape (b) Sensors

(c) Mu–metal (d) Floppy disc

114. The concentrations of electrons and holes in an intrinsic (i.e. pure) semiconductor, ni and pi, are equal and may be calculated from the expression where Eg is the forbidden energy gap, or bond strength, of the semiconductor, which on an energy band diagram is the energy separation between the conduction and valence bands; kB is boltzmann's constant. N_C and N_V are the effective densities states.

(a) $(N_cN_v)^{1/2} \exp(-E_g/2k_gT)m^{-3}$

(b) $(N_cN_v)^{2} \exp(-E_g/2k_gT)m^{-3}$

(c) $(N_cN_v)^{1/2} \exp(-E_g*2k_gT)m^{-3}$

(d) $(N_cN_v)^{3/2} \exp(-E_g/2k_gT)m^{-3}$

115. The following steps are involved in wafer cleaning procedure

(a) Removal of residual organic contaminants only

(b) Stripping of thin hydrous oxide film only

(c) Desorption of remaining atomic contaminants

(d) All the 3 above

116. For integrated circuits photolithographyis used to remove areas of a protective layer so that

(a) Chemical reactions can take place in exposed areas.

(b) Chemical reactions can take place in unexposed areas.

(c) Chemical reactions can take place in transparent areas.

(d) Chemical reactions can take place in translucent areas.

117. Dry etching refers to removal of material, typically a masked pattern of semiconductor material, by exposing material to a bombardment of ions which contain

(a) Plasma of nitrogen, chlorine and boron trichloride

(b) Plasma of sodium, chlorine and boron trichloride

(c) Plasma of nitrogen, phosphorous and boron trichloride

(d) Plasma of nitrogen, chlorine and boron trioxide

118. SiN is used in semiconductor industry such as a diffusion mask during device processing, a dielectric for memory devices because it offers a

(a) High breakdown field strength and a low fixed interface charge density.

(b) Low breakdown field strength and a high fixed interface charge density.

(c) High breakdown field strength and a high fixed interface charge density.

(d) Low breakdown field strength and a low fixed interface charge density.

119. The various Si wafer processing steps fall into following categories

(a) Coat Baking (b) Photolithography

(c) Die Attach (d) All of the above

120. Thin films of SiN are well suited as anti–reflection coating for Si solar cells because of their optical properties

(a) Refractive index and Absorption coefficient

(b) Refractive index and Adsorption coefficient

(c) Reflective index and Absorption coefficient

(d) Reflective index and Adsorption coefficient

Space For Rough Work

Space For Rough Work