PQR - 2017

# ELECTRONICS & COMMUNICATION ENGINEERING (ECE)

Time Allowed : 3 Hours ] [ Maximum Marks : 190

**DO NOT OPEN THE SEAL GIVEN ON THE RIGHT HAND SIDE UNLESS INSTRUCTED BY THE INVIGILATOR**

The Question Paper will contain 150 questions and will have 3 Sections as below :

| Section | | No. of Questions | Marks |
|---|---|---|---|
| (a) | Part A | 100 | 100 |
| (b) | Part B | 40 | 80 |
| (c) | Part C - General Knowledge (Common Part of all Subjects) | 10 | 10 |
| Total | | 150 Questions | 190 Marks |

## INSTRUCTIONS TO THE CANDIDATES

1. Read carefully and comply.
2. Fill the details including Name of the Candidate, Register Number, Question Paper Booklet Series in the OMR Answer Sheet. If you fail to fill the details and sign as instructed correctly, you will be personally responsible for the consequences arising during the scanning of your Answer Sheet.
3. All the 150 questions are of MCQ (Multiple Choice Questions) type. For each Question you will find 4 possible answers marked by the letters A, B, C and D. You are to select only one correct answer and mark in OMR Answer Sheet as per the instructions given therein. In any case, choose only one answer for each question. There will be no negative marking for wrong answers.
4. In the OMR Answer Sheet for each and every question shade only one answer. If more than one answers are shaded that question will be rejected for valuation.
5. Indicate your answer by darkening the appropriate circle as per the instructions given in the OMR Answer Sheet otherwise his/her Answer Sheet is liable to be rejected. For marking answers use Blue or Black Ball Point Pen only. Ensure that you darken only one circle. Darken it completely and don't overlap with any other circle.
6. Don't mark anything (including marking like ✓, ⊙, □) in the question paper booklet other than space provided for this purpose. If you fail to follow this, you will be disqualified.
7. In any event of any mistake in any Questions, candidates will not be penalized. However, no corrections will be made in Questions during the Examination.
8. Use of Mobile Phone, Pager, Digital Diary or any other Electronic Instrument etc., is not allowed. Their use will result in disqualification.
9. No candidate should leave the Examination Hall before the final bell. The OMR Answer Sheet should be handed over to the invigilator before leaving the Examination Hall. **The candidate is allowed to take the Question Booklet and Carbon copy of the OMR Answer Sheet with Him/ Her after the examination.**

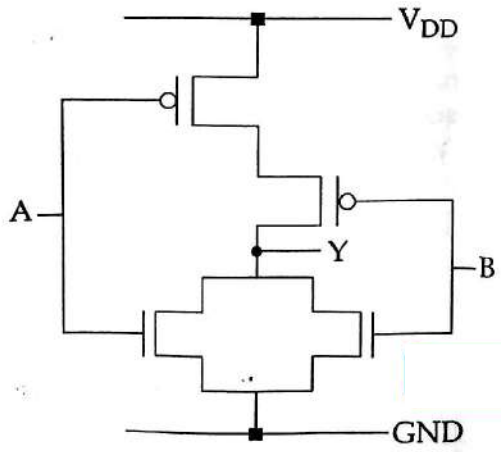
1. A decoder is a combinational circuit that converts binary information from :
   (A) $2^n$ input lines to n output lines
   (B) n input lines to a maximum of $2^n$ output lines
   (C) n input lines to $2^{n-1}$ output lines
   (D) $2^{n-1}$ input lines to n output lines

2. The difference in arrival of the edge of a clock phase at a destination in the circuit with respect to the clock edge at the source of the clock signal.
   (A) Relative clock skew (B) Absolute clock skew
   (C) Clock skew (D) Clock delays

3. A single momentary transient in an output signal that should have remained static in response to an input change is :
   (A) Dynamic hazard (B) Static hazard
   (C) Essential hazard (D) Race

4. In a n mos transistor, when Vgs = 0 and to cause the channel to cease to exist a negative voltage $V_{td}$ (threshold Voltage) must be applied between gate and source. The transistor operates in :
   (A) n mos enhancement mode (B) n mos Depletion mode
   (C) P mos enhancement mode (D) p mos depletion mode

5. The output equation for the following CMOS circuit is :




   (A) $Y=\overline{A}+\overline{B}$ (B) $Y=\overline{A\cdot B}$ (C) $Y=\overline{A+B}$ (D) $Y=\overline{A}\cdot\overline{B}$

6. During the design of BCD to 7 segment decoder, what value is initialized to display 9.
   (A) 5 BH (B) 70 H (C) 73 H (D) 7 FH

7. How many address lines required to design $1024 \times 8$ bit Random access memory.
(A) 1024 (B) 8 (C) 11 (D) 10

8. The number of MOS transistors required to implement a typical dynamic RAM cell is :
(A) 6 (B) 5 (C) 1 (D) 2

9. How many T states required to execute INT 45H instruction :
(A) 7 T (B) 4 T (C) 10 T (D) 6 T

10. Ramu used move A, @ A + DPTR instruction to access the memory content and executed successfully. The teacher asked what type of addressing mode of this instruction. He couldn't answer. Can you help him to get signature ?
(A) Register indirect addressing mode (B) Indexed addressing mode
(C) Relative addressing mode (D) Register addressing mode

11. The $n^{th}$ moment of a continuous random variable X is defined by :

(A) $E\left(X^n\right) = \int_0^{\infty} x^n f_X(x)dx$ (B) $E\left(X^n\right) = \int_{-\infty}^{o} x^n f_X(x)dx$

(C) $E\left(X^n\right) = \int_{-\infty}^{\infty} x^n f_X(x)dx$ (D) $E\left(X^n\right) = \int_0^{\infty} x^{n-1} f_X(x)dx$

12. A broadcast radio transmitter radiates 5 KW when the modulation percentage is 80. How much of this is carrier power ?
(A) 4 KW (B) 3.8 KW (C) 3.6 KW (D) 6.25 KW

13. The distortion due to aperture effect can be corrected by :
(A) Equalizer (B) Clipper (C) Low pass filter (D) Capacitor

14. Disadvantage of PCM is its :
(A) high signal to noise ratio (B) high bit rate
(C) high bandwidth (D) high power requirement

15. If 'r' is the code rate and '$d'_{free}$ its the free distance of the convolutional code, then Asymptotic codic gain of a binary symmetric channel is :

(A) $10 \log_{10}\left(\frac{d_{free} \cdot r}{2}\right)$ (dB) (B) $10 \log_{10}(d_{free} \cdot r)$ (dB)

(C) $10 \log_{10}\left(\frac{d_{free}}{2.r}\right)$ (dB) (D) $10 \log\left(\frac{d_{free}}{r}\right)$ (dB)

16. A loss-less transmission line having characteristic impedance of 100 ohm is connected to a load of 200 ohm. The voltage reflection coefficient is :

(A) 1 (B) 3 (C) $\frac{1}{3}$ (D) $\frac{2}{3}$

17. At what frequency a wave must propagate for the D-region to have an index of refraction 0.5 ? Given N = 400 electron /c.c for D.region :

(A) 107.82 kHz (B) 250.82 kHz (C) 207.82 kHz (D) 180 kHz

18. What is the critical frequency for reflection at vertical incidence is the maximum value of electron density is $1.24 \times 10^6$ $cm^{-3}$ ?

(A) 12.0215 MHz (B) 8.0215 MHz (C) 10.0260 MHz (D) 25.0215 MHz

19. In an air line, adjacent maxima are found at 12.5 cm and 37.5 cm. The operating frequency is :

(A) 1.5 GHz (B) 600 MHz (C) 300 MHz (D) 1.2 GHz

20. Which of the following statements are true ?

(A) The dominant mode is the mode with the lowest cutoff frequency

(B) The dominant mode is the mode with the longest cutoff wavelength and higher cut off frequency

(C) The dominant mode is the mode with the highest cutoff frequency

(D) The dominant mode is the mode with the lowest cutoff wavelength

21. The 4 - point inverse DFT on the sampled discrete time fourier transform X ($e^{jw}$) of $x(n) = \{0\ 1\ 2\ 3\ 4\ 5\}$ is :

(A) {4 6 2 3} (B) {0 1 2 3} (C) {2 3 4 5} (D) {5 0 1 2}

22. Given two finite duration sequences $x_1(n)$ and $x_2(n)$ that are zero outside the interval [0,99]. These sequences are circularly convolved to generate $y(n) = x_1(n) \textcircled{N} x_2(n)$ where N = 100. If $x_1(n)$ is non zero for $10 \le n \le 39$, the values of 'n' for which $y(n) = x_1(n) * x_2(n)$ is :

(A) $0 \le n \le 99$ (B) $10 \le n \le 39$ (C) $10 \le n \le 100$ (D) $39 \le n \le 99$

23. A continuous time signal is sampled at a rate of 4096 samples/sec. In the computation of a 4096 point DFT of the sampled signal, the number of frequency samples needed for FFT algorithm to be more efficient than direct computation is :

(A) 1 (B) 6 (C) 8 (D) 16

24. The impulse response of a second order Linear Time Invariant digital filter characterized by

$$H(z) = \frac{(\alpha-\beta)z^{-1}}{(1-\alpha z^{-1})(1-\beta z^{-1})}, |\alpha| < 1 < |\beta| \text{ with ROC } |\alpha| < |z| < |\beta| \text{ is given by :}$$

(A) $h(n) = \alpha^n u(n) - \beta^n u(n)$

(B) $h(n) = \alpha^n u(n) + \beta^n u(-n-1)$

(C) $h(n) = -\alpha^n u(-n-1) + \beta^n u(-n-1)$

(D) $h(n) = \alpha^n u(-n-1) + \beta^n u(n)$

25. A continuous time signal $x(t) = 2\ cos\ (100\ \pi t)$ is sampled at a sampling rate of 75 Hz, to generate a sequence $x(n)$. The frequency of a sinusoid that yields samples identical to $x(n)$ is :

(A) $\frac{4}{3}$ (B) $\frac{1}{2}$ (C) $\frac{2}{3}$ (D) $\frac{1}{3}$

26. Simplify the expression $\overline{\overline{AB} + \overline{A} + AB}$ :

(A) $= 1$ (B) $= 0$ (C) $= A$ (D) $= \overline{A}$

27. Reduce the expression and write which gate to buy.

(NOR) XOR (NAND) :

(A) NOR (B) NAND (C) XNOR (D) XOR

28. Construct $16 \times 1$ multiplexer using $2 \times 1$ multiplexer. How many $2 \times 1$ multiplexer are required to construct ?

(A) 16 (B) 8 (C) 4 (D) 7

29. Which of the following flip flop used as Latch ?

(A) DFF (B) TFF (C) JKFF (D) RSFF

30. The binary value in the shift register is shift righted by one bit position which represents ?

(A) multiplication by $2^0$ (B) multiplication by $2^1$

(C) Division by $2^0$ (D) Division by $2^1$

31. In a 100% amplitude modulated signal, if the total transmitted power is P, then the Carrier Power will be :

(A) $\frac{2}{3}$ P (B) $\frac{1}{2}$ P (C) $\frac{1}{3}$ P (D) $\frac{1}{4}$ P

32. Which one of the following Modulation scheme is the most efficient for pulse telemetry ?
(A) PAM (B) PCM (C) PPM (D) PWM

33. Double spotting in superheterodyne Receiver is caused by :
(A) poor front end rejection (B) misalignment of Receiver
(C) detaining of one or more IF stage (D) non functioning of AGC

34. Transponders are :
(A) Only the Transmitter in a satellite
(B) Only the Receiver in a satellite
(C) Transmitter and receiver combination in a satellite
(D) None of the above

35. Expensive tracking equipment is not requires for :
(A) Low earth orbit satellite LEO
(B) Medium earth orbit satellite MEO
(C) Geosynchronous earth orbit GEO satellite
(D) All the above three types

36. Why n-type switch is not preferred over CMOS Switch ?
(A) n type transmits a logic 0 well, but when $V_{DD}$ is applied to the drain, the voltage at the source is $V_{DD} - V_{tn}$.
(B) n type transmits a logic 1 well, but when $V_{DD}$ is applied to the drain, the voltage at the source is $V_{DD} - V_{tn}$.
(C) n type transmits a logic 0 well, but when $V_{DD}$ is applied to the drain, the voltage at the source is $V_{tn} - V_{DD}$.
(D) n type transmits a logic 1 well, but when $V_{DD}$ is applied to the drain, the Voltage at the source is $V_{tn} - V_{DD}$.

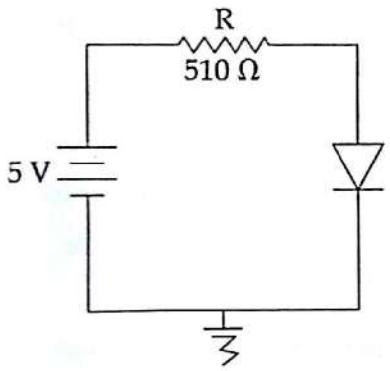
37. Why recirculating latch are called quasi static ?
(A) Because the latched data will vanish if the clocks are running.
(B) As long as the clocks are running the data will be recirculated and refreshed
(C) The latched data will not vanish if the clocks are stopped
(D) As long as the clocks are running the data will not be recirculated and refreshed

38. If $A = (a_n\, a_{n-1} \ldots\ldots a_0)$ and $B = (b_n\, b_{n-1} \ldots\ldots b_0)$ then the product A·B is expressed as :
(A) $(A.\ 2^{\circ}b_n + A.2^{1}b_{n-1} + A.2^{2}b_{n-2} \ldots + A.2^{n}b_0)$
(B) $(2^{\circ}\, b_n + 2^{1}b_{n-1} + 2^{2}\, b_{n-2} \ldots + 2^{n}b_0)$
(C) $(2^{n}\, b_n + 2^{n-1}b_{n-1} + \ldots\ldots + 2^{\circ}\, b_0)$
(D) $(A.\ 2^{n}.b_n + A.2^{n-1}.b_{n-1} + A{\cdot}2^{n-2}.b_{n-2} \ldots\ldots + A2^{\circ}{\cdot}b_0)$

39. The n-channel Mos and p-channel mos is turned off :
(A) If gate source voltage is zero
(B) If gate to source voltage is positive
(C) If gate to source voltage is negative
(D) If gate to drain voltage is positive

40. The important property of wallace tree multipliers :
(A) Constructed from adder cells, adder cells grows as logarithm $\log_2$ (n) of the number of input bits n.
(B) Adder cells grows as 2n of the input bits
(C) Constructed from multiplexers
(D) Constructed from adder cells, adder cells grows as logarithm $\log_2$ (2n) of the number of input bits n.

41. For a series circuit having a voltage source, a resistor and an ideal diode, the voltage across the resistor and the circuit current are :




(A) 4.3V and 8.34 mA
(B) 4.3V and 8.43 mA
(C) 3.4V and 4.83 mA
(D) 3.4V and 3.48 mA

42. The transistor is in saturation when ?
(A) both collector and emitter Junction's are forward biased
(B) both collector and emitter Junctions are reverse biased
(C) emitter Junction forward biased, the collector Junction reverse biased
(D) emitter Junction is reverse biased, collector Junciton forward biased

43. The JFET is called square law device because its :
(A) Transconductance curve is parabolic
(B) A.C resistance from drain to source varies inversely as square of the drain current
(C) Drain current varies as square of drain voltage for a fixed gate to source voltage
(D) Reverse gate leakage current varies as a square of reverse gate voltage

44. A Enhancement MOSFET $I_D(on) = 10mA$ at $V_{DS} = -12V$ and $V_{DS}(th) = -3V$. The value of $I_D$ when $V_{GS} = -6v$ is :

(A) 1.80 mA (B) 1.08 mA (C) 8.01 mA (D) 0.108 mA

45. The astable multivibrator has a base resister of 20 k Ω and capacitors of 100 pF. The frequency of output is :

(A) 362 kHz (B) 0.362 kHz (C) 3.62 kHz (D) 36.2 kHz

46. The effectiveness of a data communication system depends on the following fundamental characteristics.

(A) Delivery (B) Accuracy (C) Timeliness (D) All the above

47. Match the following with most appropriate data formats :

| | OSI Layers | | Data formats |
|---|---|---|---|
| (a) | Physical | (i) | segments |
| (b) | Data link | (ii) | packets |
| (c) | Network | (iii) | frames |
| (d) | Transport | (iv) | bits |

**Codes :**

| | (a) | (b) | (c) | (d) |
|---|---|---|---|---|
| (A) | (iv) | (iii) | (ii) | (i) |
| (B) | (iv) | (ii) | (iii) | (i) |
| (C) | (i) | (ii) | (iii) | (iv) |
| (D) | (i) | (iii) | (ii) | (iv) |

48. The GSM system architecture consists of the following major interconnected subsystem(s).

(A) Base station subsystem (B) Network and switching subsystem
(C) Operation support subsystem (D) All the above

49. _____ is a handoff method in which a mobile station may continue the connection with new base station before breaking off from the previous base station.

(A) Hard handoff (B) Soft handoff
(C) Break over (D) Roaming

50. TCP and UDP protocols are part of the following TCP/IP layers :

(A) Physical and Data link layers (B) Network layer
(C) Transport layer (D) Application layer

51. Gain crossover frequency is the one at which $|G(j\omega)H(j\omega)|$ is :

(A) equal to 1 (B) equal to $-1$ (C) $> 1$ (D) $< -1$

52. The pole factor $\frac{1}{1+j\omega T}$ has a slope of :

(A) 20 dB/dec (B) $-20$ dB/dec (C) 40 dB/dec (D) $-40$ dB/dec

53. If the gain of open loop system is doubled, the gain margin :

(A) is not affected (B) gets doubled

(C) becomes half (D) becomes one-fourth

54. The term reset control refers to :

(A) Proportional control (B) Integral control

(C) Derivative control (D) PID control

55. The resolution of potentiometer must be :

(A) Infinite (B) Very high (C) Zero (D) Medium

56. State which one is not a generalised unity feed back control system component ?

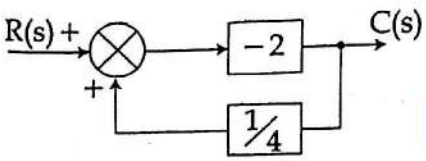
(A) Error detector (B) Amplifier (C) Rectifier (D) Error corrector

57. The product of branch gains encountered in traversing the loop is :

(A) Loop gain (B) Forward path gain

(C) Branch gain (D) Path gain

58. The closed loop gain of the system shown below is :




(A) $-4/3$ (B) $4/3$ (C) $-4$ (D) 4

59. For a given system Routh's array is given below. The system is :

| | | | |
|---|---|---|---|
| $S^4$ | 1 | 3 | 7 |
| $S^3$ | 1 | 2 | 0 |
| $S^2$ | 1 | 7 | |
| $S^1$ | −5 | | |
| $S^0$ | 7 | | |

(A) Marginally stable
(B) Unstable
(C) Stable
(D) Conditionally stable

60. For $0 < \xi < \frac{1}{2}$, $\omega_r$ is equal to :

(A) 0 (B) $\frac{\omega_n}{\sqrt{1-\xi^2}}$ (C) $\omega_n\sqrt{1-\xi^2}$ (D) $\omega_n\sqrt{1-2\xi^2}$

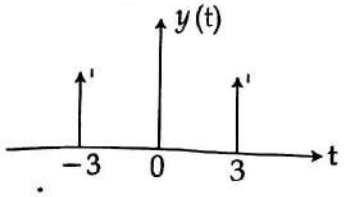
61. The mapping that may be used to map low pass analog filters into high pass digital filters and high pass analog filters into low pass digital filters is :

(A) $s=\frac{1-z^{-1}}{1+z^{-1}}$ (B) $s=\frac{1+z}{1-z}$ (C) $s=\frac{1-z^{-1}}{2}$ (D) $s=\frac{1+z^{-1}}{1-z^{-1}}$

62. The transfer function of an unstable system is given by $H(z)=\frac{1}{1-1.5z^{-1}-3z^{-2}}$ The system may be stabilized by using a feedback system of the form $G(z) = Kz^{-2}$. The value of K is :

(A) $K > 2$ (B) $1 < K < 2$ (C) $K < 3.5$ (D) $3.5 < K < 4$

63. The derivative of a signal $x(t)$ is shown below :




The signal $x(t)$ is _____.

(A) $u(t-3) - u(-t-3)$
(B) $u(t-3) - u(t+3)$
(C) $u(t+3) - u(t-3)$
(D) $u(t) - u(t-3)$

64. The signals $x_1(t)$ and $x_2(t)$ are band limited to $4\pi$ rad/sec and $10\pi$ rad/sec respectively. The minimum sampling rate required for sampling the signal $x_1(2t) + x_2(t/2)$ is :

(A) $16\pi$ rad/sec (B) $8\pi$ rad/sec

(C) $40\pi$ rad/sec (D) $2\pi$ rad/sec

65. The linear time invariant system $h(t) = \left(e^{-4t} + e^{4t}\right).u(t)$ is _____ and _____.

(A) Causal, Unstable (B) Noncausal, Unstable

(C) Causal, Stable (D) Noncausal, Stable

66. Hall effect may be used to :

(A) find the type of semiconductor (P or N)

(B) find the carrier concentration

(C) to measure conductivity and mobility

(D) all the above

67. In the BJT symbol the arrow in the emitter shows the direction of :

(A) holes

(B) electrons

(C) holes in PNP and electrons in NPN

(D) electrons in PNP and holes in NPN

68. The efficiency of a full wave rectifier is :

(A) 81.2% (B) 40.6% (C) 50% (D) 100%

69. The trivalent impurity is :

(A) Antimony (B) Bismuth (C) Arsenic (D) Boron

70. The process of adding impurities to a pure semiconductor is called :

(A) mixing (B) doping (C) diffusing (D) refining

71. Identify the false statement for a square matrix A of order n :

(A) If A is invertible then its transpose also invertible

(B) The column of A forms a linearly dependent set, if it is invertible

(C) There is a matrix B of order n such that $AB = I$, if A is non-singular

(D) The equation $AX = O$ has a trivial solution, if A is invertible

72. The flux of $\vec{F} = xz\,\vec{i} + xy\,\vec{j} + yz\,\vec{k}$ outward through the surface of the cube cut from the first octant by the planes $x=2$, $y=3$, $z=1$ is :

(A) 18 (B) 0 (C) 9 (D) 36

73. $\int_{(0,0)}^{(2,4)} (x^2 - iy^2)\,dz$ over the parabola $y=x^2$ is :

(A) 0 (B) $-2\pi i$ (C) $2\pi i$ (D) $24 + \frac{8i}{5}$

74. For any discrete distribution standard deviation is :

(A) Equal to mean deviation from mean
(B) Square of the mean deviation from mean
(C) Not less than mean deviation from mean
(D) Less than mean deviation from mean

75. The root of $f(x) = x^3 - 3x^2 + 1$ lies in :

(A) (1, 2) (B) (−1, 0) (C) (0, 0.5) (D) (0, 1)

76. If $A = \begin{pmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{pmatrix}$ and $A + A^T = I$, then $\theta$ is equal to :

(A) $2n\pi \pm \frac{\pi}{2}, n \in I$ (B) $2n\pi \pm 4\frac{\pi}{3}, n \in I$

(C) $2n\pi \pm 2\frac{\pi}{3}, n \in I$ (D) $2n\pi \pm \frac{\pi}{3}, n \in I$

77. What is wrong with $\int_{-1}^{3} \frac{1}{x^2}\,dx = \frac{-4}{3}$ ?

(A) $-\frac{4}{3}$ (negative)
(B) $f(x)$ is continuous at the end points
(C) Fundamental theorem of calculus can be applied
(D) Discontinuity at $x=0$ and hence $\int_{-1}^{3} \frac{1}{x^2}\,dx$ does not exist.

78. The derivative $f'(x)$ of a function $f(x)$ is positive or zero in (a,b) without being zero always. Then in (a, b) :

(A) $f(b) < f(a)$ (B) $f(b) > f(a)$

(C) $f(b) - f(a) = f'(c), c \in (a,b)$ (D) $f(b) = f(a)$

79. The complementary function for the solution of the differential equation $2x^2 y'' + 3x y' - 3y = x^3$ is obtained as :

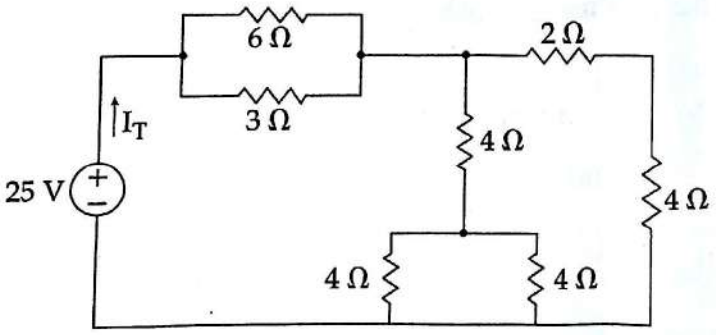
(A) $Ax + Bx^{-3/2}$ (B) $Ax + Bx^{3/2}$

(C) $Ax^2 + Bx$ (D) $Ax^{-3/2} + Bx^{3/2}$

80. For the differential equation $\frac{dy}{dx} = x^2 y - 1$, $y(0) = 1$, the value of y at $x = 0.1$, using the taylors series method, is given by :

(A) 0.9 (B) 1 (C) 0.8 (D) $-1$

81. Obtain the current $I_T$ for the circuit below :

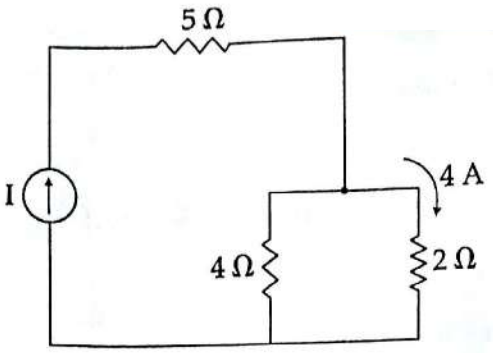



(A) 2 A (B) 15 A (C) 5 A (D) 10 A

82. A practical current source has a current of 22.0 A. Loading the source with 50.0 Ω results in a terminal voltage of 390.3V. Obtain the source constants, I and R.

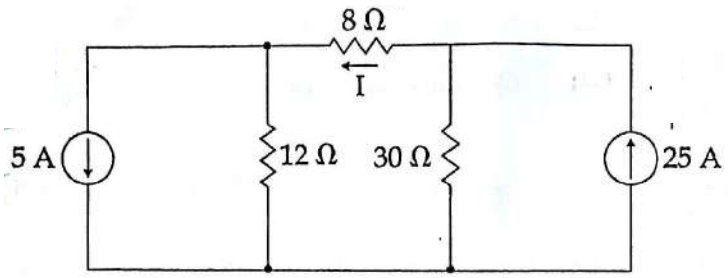
(A) 10.0A, 50 Ω (B) 50.2A, 10 Ω (C) 27.5A, 50 Ω (D) 22.0A, 27.5 Ω

83. Determine the power delivered by the current source in figure below :



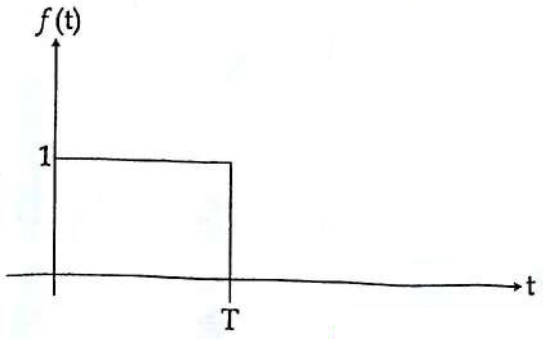

(A) 156 W (B) 498 W (C) 228 W (D) 59 W

84. Find the current I in figure below :




(A) 16.2 A (B) 6.5 A (C) −25 A (D) 35.7 A

85. Obtain the Laplace transform of the gate function shown in figure below :




(A) $\frac{e^{-TS}}{S}$

(B) $\frac{A}{TS^2}\left[1-e^{-TS}-STe^{-TS}\right]$

(C) $\frac{1-e^{-TS}}{S}$

(D) $\frac{1}{1-e^{-ST}}$

86. In OSI Reference model, which layer is responsible for the process to process delivery of the entire message ?

(A) Data Link Layer
(B) Transport Layer
(C) Network Layer
(D) Application Layer

87. If a LAN with star topology uses a Hub instead of a switch, its operation is exactly like a :

(A) Bus topology
(B) Ring topology
(C) Star topology
(D) Bus or Ring topology depends on the address of the frame

88. Cloud Infrastructure shared by several organizations and supporting a specific group is called :

(A) Private cloud
(B) Community cloud
(C) Public cloud
(D) Hybrid cloud

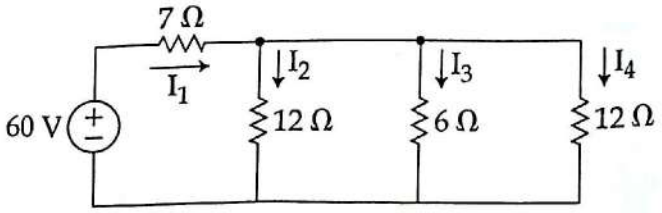
89. In a cellular network, a cell must be designed to serve _____ modules located at the _____ cell within the foot print.

(A) Weekest, edge (B) Weekest, centre (C) Strong, edge (D) Strong, centre

90. The principle used in GPRS for the dynamic allocation of channels is based on :

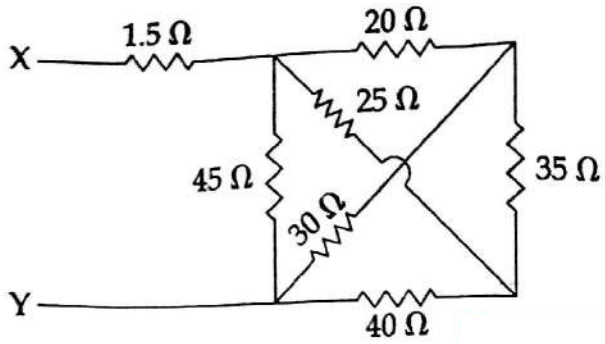
(A) Capacity on demand
(B) Enhanced data rates for global evolution (EDGE)
(C) Flexible TDMA
(D) Point to multipoint multicast service (PTM-M)

91. Use branch currents in the network shown in below figure to find the current supplied by the 60 – V source.



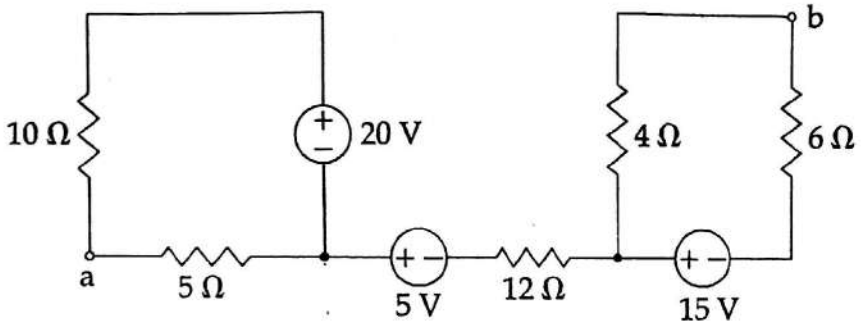

(A) 8 A
(B) 6 A
(C) 12 A
(D) 3 A

92. Find the equivalent resistance across the terminals X – Y, for the below figure.



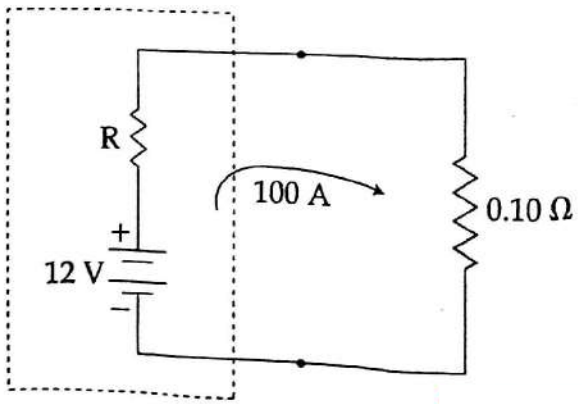

(A) 32.35 Ω (B) 64.5 Ω (C) 16.175 Ω (D) 5.35 Ω

93. In the network below, find the voltage between points a and b, $V_{ab}$ :



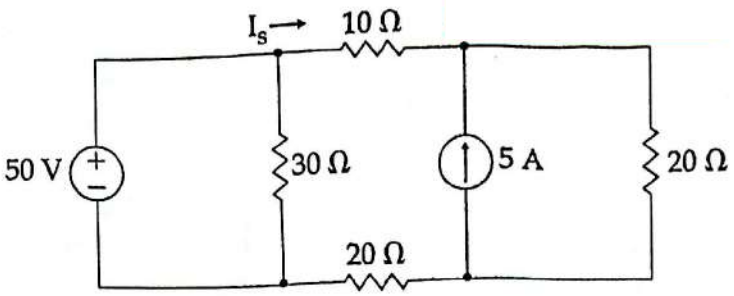

(A) 13.15 V (B) 17.65 V (C) 7.25 V (D) 10.45 V

94. Calculate the internal resistance of a battery which has an open-circuit voltage of 12.0V and delivers 100A to a resistance of 0.10 Ω.
The battery with its internal resistance R is modeled below :




(A) 0.2 Ω (B) 0.4 Ω (C) 0.06 Ω (D) 0.02 Ω

95. Obtain the current $I_s$ in 10Ω resistor in figure below :




(A) −4 A (B) −1 A (C) −3.2 A (D) −7 A

96. The divergence of the curl of a vector is equal to :
(A) 0 (B) 1 (C) α (D) Not defined

97. Given $\vec{A} = \vec{i}\, x^2 z - \vec{j}\, 2y^3 z^2 + \vec{k}\, xy^2 z$. $\nabla . \vec{A}$ at point (1, −1, 1) is :
(A) −6 (B) 2 (C) 3 (D) −3

98. If the magnitude of $\vec{H}$ in a plane wave is 1 A/m, what is the magnitude of $\vec{E}$ for a plane wave in free space :
(A) 376.8 v/m (B) 148 π v/m (C) 140 π v/m (D) 1 mv/m

99. A rectangular waveguide acts as a :
(A) low pass filter (B) high pass filter (C) band pass filter (D) band stop filter

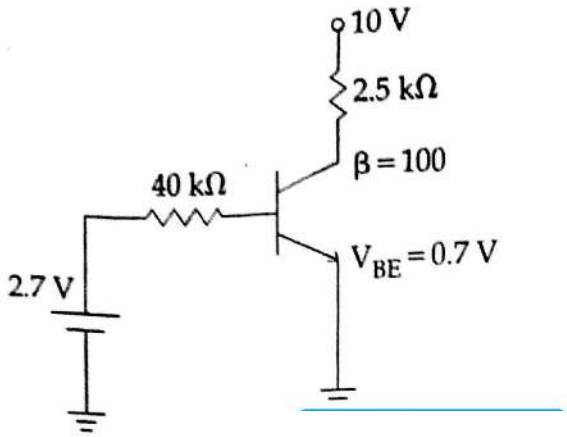
100. A plane wave in free space has an average pointing vector of 1.5 W/m$^2$. The average energy density is :
(A) 5 n J/m$^3$ (B) 2 n J/m$^3$ (C) 4.5 n J/m$^3$ (D) 1 n J/m$^3$

101. The cutoff wavelength in a standard rectangular waveguide for the $TE_{11}$ mode is :
(A) 1.126 am (B) 0.8944 am (C) 1 am (D) 0.955 am

102. An antenna has $U_{max} = 10$ W/sr, $U_{ave} = 4.5$ W/sr and $\eta_r = 95\%$. The input power to the antenna is :
(A) 2.222 W (B) 12.11 W (C) 55.55 W (D) 59.52 W

103. A silicon diode has a bulk resistance of 2Ω and a forward current of 12 mA. The actual voltage across the diode is :
(A) 0.6 V (B) 24 V (C) 2.4 V (D) 0.624 V

**104.**




The base current for the above circuit is :

(A) 50μA (B) 50mA (C) 108 mA (D) 108μA

**105.** A diode has a maximum power dissipation of 0.5 watts (a) what is the maximum d.c. current allowed in the forward direction when the forward voltage drop is 1 volt ? (b) what is the break down current that burns out the diode if the breakdown voltage is 150 V ?

(A) 0.5A, 3.33 mA (B) 5A, −3.33 mA

(C) 50A, 3.33 mA (D) 0.05A, −3.33 mA

**106.** In a binary PCM system, the output-signal-to-noise ratio is to be held to a minimum of 40 dB. Determine the member of required levels.

(A) 5 (B) 6 (C) 7 (D) 8

**107.** Assume that, in a stop-and-wait ARQ system, the bandwidth of dataline is 1Mbps, and 1 bit takes 20ms to make a round trip. Find the bandwidth-delay product and the utilization percentage of the link respectively if the system data frames are 1000 bits in length.

(A) 20,000 bits, 5% (B) 10,000 bits, 10% (C) 5,000 bits, 20% (D) 40,000 bits, 2.5%

**108.** Choose the protocol (S) supporting the IP in network layer of TCP/IP Protocol Suite.

(A) ARP (B) RARP (C) IGMP (D) All the above

**109.** For a (n, k) block code, there are $2^k$ valid code words out of $2^n$ possible code words, the redundancy of the code and code rate are :

(A) (k−n)/n, n/k (B) (n−k)/n, k/n (C) (k−n)/k, n/k (D) (n−k)/k, k/n

110. OFDM technology is a combination of :

(A) Multicarrier, Multirate Modulation with Multiplexing

(B) Multicarrier, Multisymbol, Multirate Modulation with Multiplexing

(C) Multicarrier, Multisymbol Modulation with Multiplexing

(D) Multisymbol, Multirate Modulation with FDM

111. A monostable multivibrator is required to convert a 100 kHz, 30% duty cycle square wave to a 100 kHz, 50% duty cycle square wave find the values of R and C :

(A) $R = 7.246\ k\Omega,\ C = 1nF$ (B) $R = 7.426\ k\Omega,\ C = 0.1nF$

(C) $R = 7.642\ k\Omega,\ C = 0.01nF$ (D) $R = 6.742\ k\Omega,\ C = 1nF$

112. Which of the following Boolean expression is incorrect ?

(A) $A+\bar{A}B=A+B$ (B) $A+AB=B$

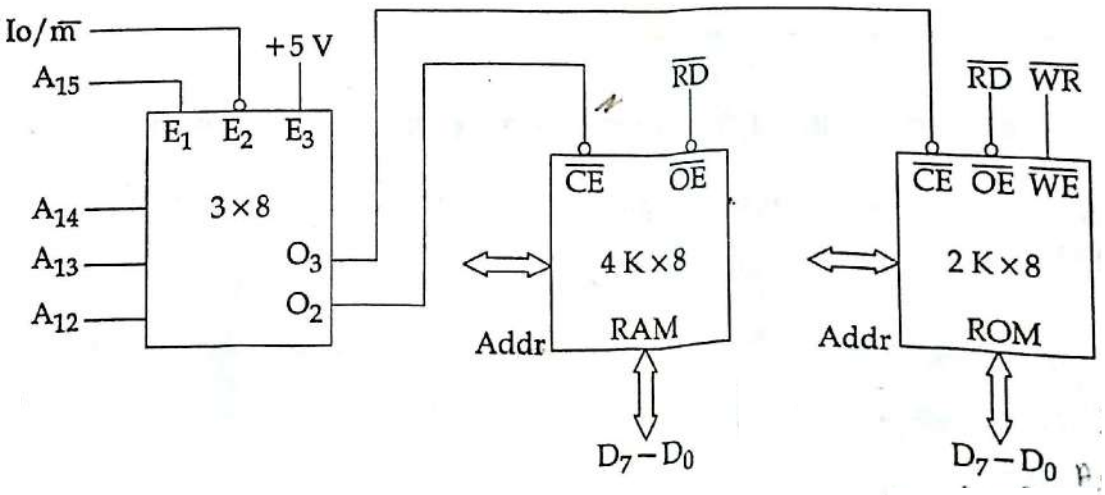
(C) $(A+B)(A+C)=A+BC$ (D) $(A+B')(A+B)=A$

113. A six bit ladder D/A converter has a digital input : 101001. Find the analog voltage for this D/A converter. Give $V_{ref}=10V$ :

(A) 6.0 (B) 41.32 (C) 6.406 (D) 0.6406

114. Simplify the expression $F(A, B, C) = \Sigma\ (0, 2, 4, 5, 6)$

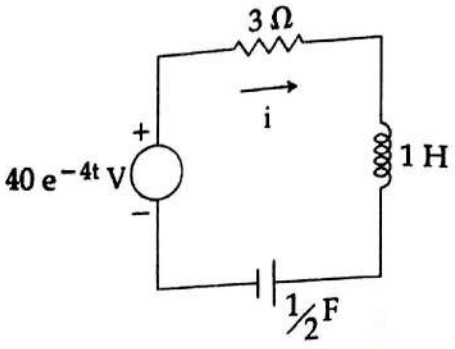
(A) $A+B+C$ (B) $AB'+C'$ (C) $A'B+C'$ (D) $AB+C$

115. 


What is the starting and Ending address of the RAM ?

(A) 0000 - FFFFH (B) 1000 - 1FFFH (C) 2000 - 2FFFH (D) 3000 - 3FFFH

**116.** The circuit is driven by a voltage source $40e^{-4t}$ V. The initial value of the voltage across the capacitor and the initial current through the inductor are both Zero. The current i is :



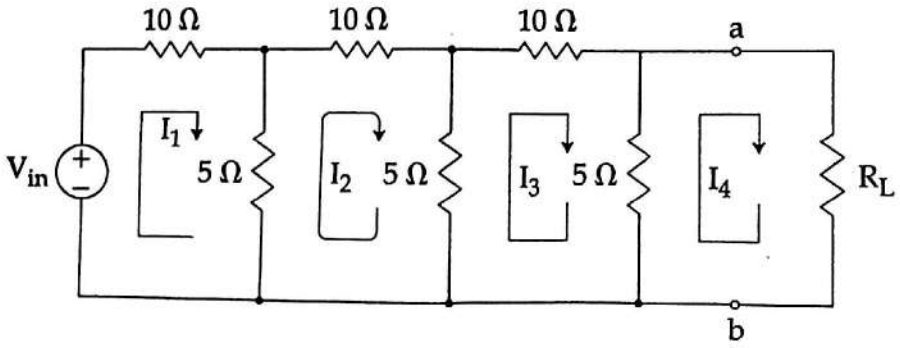

(A) $i = 40e^{-2t} - \frac{40}{3}e^{-t} - \frac{80}{3}e^{-4t}$

(B) $i = 40e^{2t} + \frac{40}{3}e^{t} + \frac{80}{3}e^{-4t}$

(C) $i = -40e^{-2t} - \frac{40}{3}e^{-t} - \frac{80}{3}e^{-4t}$

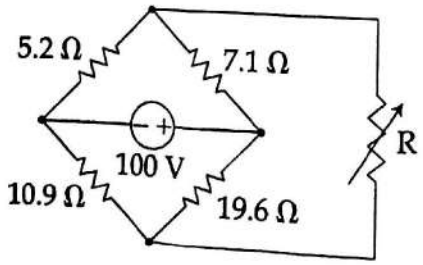
(D) $i = 40e^{-2t} + \frac{40}{3}e^{-t} + \frac{80}{3}e^{-4t}$

**117.** For the ladder network of figure, obtain the transfer resistance as expressed by the ratio of $V_{in}$ to $I_4$.




(A) $512\ R_L + 125$ (B) $125\ R_L + 187$ (C) $41\ R_L + 150$ (D) $150\ R_L + 41$

**118.** For the circuit in the figure, find the value of R that will receive maximum power. Determine this power :




(A) 10.0 Ω, 1.09 ω (B) 1 Ω, 2ω (C) 2 Ω, 10 ω (D) 5 Ω, 0.5 ω

**119.** The gradient of scalar field $U = \rho^2 z \cos(2\phi)$ is :

(A) $10 \sin^2\theta . \cos(\phi)\hat{r} + 10 \sin(2\theta) \cos(\phi)\hat{\theta} - 10 \sin\theta \sin(\phi)\hat{\phi}$

(B) $2\rho z \cos(2\phi)\hat{e} + 2\rho z \sin(2\phi)\ \hat{\phi} + \rho^2 \cos(2\phi)\hat{z}$

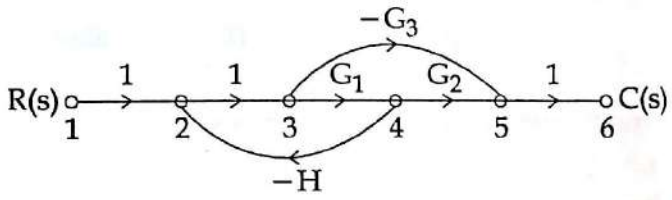
(C) $2e^{-z} \cos 2x \cosh y\ \hat{x} + e^{-z} \sin 2x \sinh y\ \hat{y} - e^{-z} \sin 2x \cosh y\, \hat{z}$

(D) $2\rho z \cos(2\phi)\ \hat{e} - 2\rho z \sin(2\phi)\ \hat{\phi} + \rho^2 \cos(2\phi)\hat{z}$

**120.** A rectangular waveguide with dimensions $a = 2.5$cm, $b = 1$ is to operate below 15.1 GHz. Calculate the cutoff frequency for $TE_{01}$ mode of the waveguide. Given $\epsilon = 4\epsilon_o$, $\mu_r = 1$ and $\sigma = 0$.

(A) 3 GHz (B) 7.5 GHz (C) 15 GHz (D) 3.75 GHz

**121.** The signal flow graph of a feed back control system is given below. The transfer function $\frac{C(s)}{R(s)}$ of the system is,




(A) $\frac{G_1G_2 - G_3}{1 - G_1H}$ (B) $\frac{G_1G_2 - G_3}{1 + G_1H}$ (C) $\frac{G_1G_2 + G_3}{1 + G_1H}$ (D) $\frac{G_1G_2 + G_3}{1 - G_1H}$

**122.** The OLTF of an unity feed back system is given by, $G(s) = \frac{K}{S(S+1)(S+2)}$. The breakaway point of the root locus plot is given by,

(A) $-0.423$ (B) $-0.523$ (C) 0.71 (D) $-0.62$

**123.** The antenna Current of an AM transmitter is 8A when only Carrier is sent. But it increases to 8.93A when Carrier is modulated. What is the percentage modulation of the wave ?

(A) 43.0% (B) 70.1% (C) 57.0% (D) 100%

**124.** A signal contains components at 400Hz and 2400Hz This signal modulates a carrier of frequency 100MHz. However after demodulation it is found that the 400Hz signal component is present. The channel Bandwidth is 15KHz. What is the reason for the higher frequency signal not to be detected properly.

(A) Modulation used in FM and BW is insufficient
(B) Modulation used in AM and BW is insufficient
(C) Modulation used in FM but pre emphasis is not used
(D) Modulation used in AM but detector is for FM

**125.** An antenna having a noise temperature of 30 K is connected to an amplifier having gain of 100 dB and an equivalent noise bandwidth of 1.5 MHz. The equivalent noise temperature of the amplifier is 270 K. What is the available output noise power ?

(A) 58 μw (B) 62 μw (C) 30 μw (D) 47 μw

**126.** Determine the delay of when the input pattern triggers the worst case delay in a 16 bit (4×4) carry bypass adder. Assume all time taken as 1.

(A) 8 (B) 11 (C) 12 (D) 9

**127.** For the supply voltage of 2.5 V, the normalized on resistance of n mos and p mos transistors equal 13 kΩ and 31 kΩ respectively. From the layout, W/L ratios of the transistor to be 1.5 for the n mos and 4.5 for p mos. Determine the propagation delay of c mos inverter for load capacitance is 6fF.

(A) tp = 32.5ps (B) tp = 36ps (C) tp = 29ps (D) tp = 65ps

**128.** The difference between NMOS 4 to 1 multiplexer and CMOS Multiplexer :

(A) faster rise time and faster fall time
(B) faster fall time and slower rise time
(C) faster rise time and slower fall time
(D) faster fall time and faster rise time

**129.** The speed power product for static CMOS is :

(A) $Sp = CV$ (B) $Sp = C^2V$
(C) $Sp = CV^2$ (D) Sp = dependent on frequency

**130.** The estimate order of the given digital multiband filter using a Hann window

$0.99 \le \left|H\left(e^{jw}\right)\right| \le 1.01,\ 0 \le \omega \le 0.3\pi$

$\left|H\left(e^{jw}\right)\right| \le 0.01, 0.35\pi \le \omega \le 0.55\pi$ ; $0.49 \le \left|H\left(e^{jw}\right)\right| \le 0.51, 0.6\pi \le \omega \le \pi$ is :

(A) 120 (B) 124 (C) 128 (D) 45

131. The dead band range of a first order IIR filter given by $y(n) = 0.5\, y(n-1) + x(n)$ on quantization operation due to rounding with a step size of is :

(A) $\frac{1}{4}$ (B) $\frac{1}{16}$ (C) $\frac{1}{8}$ (D) $\frac{1}{32}$

132. A causal linear shift invariant system has a system function $H(z) = \frac{\left(1-2z^{-2}\right)\left(1+0.4z^{-1}\right)}{1-0.85z^{-1}}$

The system may be factorized as a cascade of _____ and _____.

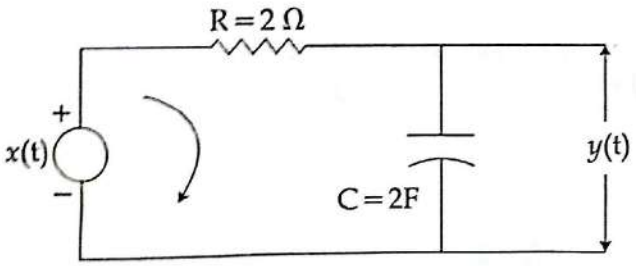
(A) Minimum phase, Highpass filter

(B) Minimum phase, lowpass filter

(C) Nonminimum phase, lowpass filter

(D) Minimum phase, All pass filter

133. The response of the given LTI (Linear Time Invariant) system :




for input $x(t) = \delta(t)$ is :

(A) $\frac{1}{4} e^{-\frac{1}{4}t} u(t)$ (B) $4e^{-4t} u(t)$ (C) $\frac{1}{2} e^{-\frac{1}{2}t} u(t)$ (D) $\frac{1}{2} e^{-2t} u(t)$

134. The range of K for stability of unity feedback system whose open loop transfer function is, $G(S) = \frac{K}{S(S+1)(S+2)}$ is :

(A) $K > 6$ (B) $K < 6$ (C) $0 < K < 6$ (D) $K = 6$

**135.** For a second order system with a closed loop transfer function, $T(f)=\frac{9}{S^2+4s+9}$. The settling time for 2 percent band in seconds is :

(A) 1.5 (B) 2 (C) 3 (D) 4

**136.** The eigen vectors of $A=\begin{pmatrix}0 & -1\\ 1 & 0\end{pmatrix}$ are :

(A) $\begin{pmatrix}1\\ -i\end{pmatrix},\begin{pmatrix}1\\ i\end{pmatrix}$ (B) $\begin{pmatrix}1\\ 0\end{pmatrix},\begin{pmatrix}-1\\ 0\end{pmatrix}$ (C) $\begin{pmatrix}0\\ 1\end{pmatrix},\begin{pmatrix}-1\\ 0\end{pmatrix}$ (D) $\begin{pmatrix}i\\ -i\end{pmatrix},\begin{pmatrix}1\\ -1\end{pmatrix}$

**137.** A man alternately tosses a coin and throws a die, beginning with coin. What is the probability that he will get a head before he gets a '5' or '6' on the die :

(A) $\frac{1}{4}$ (B) $\frac{3}{4}$ (C) $\frac{1}{2}$ (D) 1

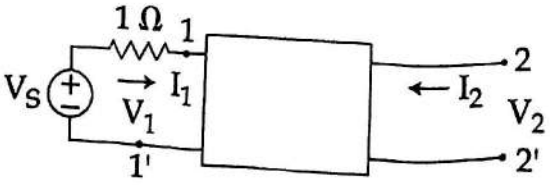
**138.** Given the system of linear equations $x+y+z=2,\ 2x+y-z=3,\ 3x+2y+Kz=4$ it has a unique solution if :

(A) $k\neq 0$ (B) $-1<k<1$ (C) $-2<k<2$ (D) $k=0$

**139.** In the Laurent series expansion of $f(z)=\frac{1}{z-1}-\frac{1}{z-2}$ valid in the region $|z|>2$, then the coefficient of $\frac{1}{z^2}$ is :

(A) $-1$ (B) 0 (C) 1 (D) 2

**140.** The $Y$ parameters of the two port network are $Y_{11}=Y_{22}=6$ ℧ ; $Y_{12}=Y_{21}=4$ ℧ :




The driving point admittance at port 2-2' if the source voltage is 100 V and has an impedance of 1Ω is :

(A) 3,741 ℧ (B) 3,714 ℧ (C) $\frac{1}{3741}$ ℧ (D) $\frac{1}{3714}$ ℧

141. Consider the following rivers :

(a) Narmada (b) Brahmaputra

(c) Godavari (d) Tapti

Which of the above is/are flowing into the Bay of Bengal ?

(A) (a), (b) and (c) only (B) (b) and (c) only

(C) (a) and (b) only (D) (a) and (c) only

142. In a class of 45 students, a boy is ranked 20th. When two boys joined, his rank was dropped by one. What is his new rank from the end ?

(A) 25th (B) 26th (C) 27th (D) 28th

143. The parliament can make any law for whole or any part of India for implementing international treaties :

(A) with the consent of all the states

(B) with the consent of the majority of states

(C) with the consent of the states concerned

(D) without the consent of any state

144. In which of the following temple, the front Mandapam is in the form of a huge chariot drawn by horses ?

(A) Patteswaram temple

(B) Darasuram temple

(C) Thanjavur Brihadeeswarar temple

(D) Thiruvarur Thyagaraja temple

145. Who won the gold both in the 5,000 and 10,000 metres event in 2017 Asian Athletics Championship ?

(A) Lakshmanan (B) Gopi Thonkanal

(C) Jinson Johnson (D) Neeraj Chopra

146. What temperature are Fahrenheit and Celsius equal ?

(A) $-40°$ (B) 574.59 (C) 40 (D) $-574.59$

147. First state to fix minimum education qualification for cooperative body poll :

(A) Rajasthan (B) West Bengal (C) Tamil Nadu (D) Karnataka

148. Who wrote the novel - 'KavalKottam' ?

(A) Vannadasan (B) S. Venkatesan (C) Joe D Cruz (D) Puviarasan

149. Article 21-A and the RTE Act came into effect :

(A) On 1st April 2010 (B) On 1st April 2009

(C) On 1st April 2017 (D) On 1st April 2005

150. Quit India Movement was launched in response to :

(A) Cabinet Mission plan (B) Cripps proposals

(C) Simon Commission Report (D) Wavell plan

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