Live Leak - SSC Scientific Assistant Electronics and Telecommunication Model Question Paper 2017

Q1. In a p-n diode, holes diffuse from p-region to n-region because.

1. There is higher concentration of holes in the p-region
2. Holes are positively charged
3. Holes are urged to move by the barrier potential
4. Free-electron in the n-region attract the holes

Q2. Thermal runaway is not encountered in FETs because.

1. I_{DS} has a zero temperature coefficient
2. I_{DS} has a negative temperature coefficient
3. I_{DS} has a positive temperature coefficient
4. The mobility of the carries decreases with increase in temperature

Q3. The electron and hole concentrations in a intrinsic semiconductor are Click and drag to move and Click and drag to move respectively. When doped with a p-type material, these change to n and p respectively, then

1. $n + p = n_i + p_i$
2. $n + n_i = p + p_i$
3. $np_i = n_i p$
4. $np = n_i p_i$

Q4. The static characteristics of an adequately forward biased pn junction is a straight line if the plot is of

1. ln Ivsln V
2. ln IvsV
3. Ivsln V
4. IvsV

Q5. A CMOS amplifier when compared to an N–channel MOSFET, has the advantage of

1. Higher cut–off frequency
2. Higher voltage gain
3. Higher current gain
4. Lower current drain from the power supply, thereby less dissipation

Q6. The effective channel length of MOSFET in saturation decreases with increase in

1. Gate voltage
2. Drain voltage
3. Source voltage
4. Body voltage

Q7. Choose proper substitutes for X and Y to make the following statement correct Tunnel diode and Avalanche photodiode are operated in X bias and Y bias respectively

1. X : reverse, Y : reverse

2. X : reverse, Y : forward
3. X : forward, Y: reverse
4. X : forward, Y: forward

Q8. Small increase in temperature in the CE connected transistor causes

1. Increase in I_{CEO}
2. Increase in ac current gain
3. Decrease in ac current gain
4. Increase in output resistance

Q9. P channel FETs are less superior than N channel FETs because

1. They have higher input impedance
2. They have high switching time
3. They consume less power
4. Mobility of elections is greater than that of holes

Q10. In an enhancement type MOSFET, the output V – I characteristics has

1. Only an ohmic region
2. Only a saturation region
3. Only ohmic region at lower voltage value followed by a saturation region at higher voltages
4. An ohmic region at large voltage values preceded by a saturation region at lower voltages

Q11. When an NPN transistor is properly biased then most of the electrons from the emitter

1. Recombine with holes in the base
2. Recombine in the emitter itself
3. Pass through the base to the collector
4. Are stopped by the junction barrier

Q12. Intrinsic semiconductors are those which –

1. Are available locally
2. Are made of the semiconductor material in its purest from
3. Have more electrons than holes
4. Have zero energy gaps

Q13. The SiO_2 layer in an IC acts as a/an

1. Resistor
2. An insulting layer
3. Mechanical output
4. None

Q14. In the study of BJT as an amplifier, if $\boldsymbol{\alpha} = \frac{\mathbf{i_c}}{\mathbf{i_e}}$ and $\boldsymbol{\beta} = \frac{\mathbf{i_c}}{\mathbf{i_b}}$, where $\mathbf{i_c}, \mathbf{i_e}, \mathbf{i_b}$ are the collector, emitter and base currents, then

1. $\beta = (1-\alpha)/\alpha$
2. $\beta = \alpha/(1-\alpha)$
3. $\beta = \alpha/(1+\alpha)$
4. $\beta = (1+\alpha)/\alpha$

Q15. The leakage current in Si is $\mathbf{10\mu A}$ at $\mathbf{10^{\circ}C}$. The leakage current when $\mathbf{T = 30^{\circ}C}$ is

1. $10\mu A$
2. $20\mu A$
3. $40\mu A$
4. $80\mu A$

Q16. The drift velocity of holes is 5cm/sec5cm/sec under a field of 100V/cm100V/cm. The mobility is

1. $0.5 cm^2/Vsec$
2. $0.05 cm^2/Vsec$
3. $20 cm^2/Vsec$
4. $5 m^2/Vsec$

Q17. A Common Base amplifier is characterized by

1. High current gain and High Voltage gain
2. Low current gain and Low Voltage gain
3. Low current gain and High Voltage gain
4. High current gain and Low Voltage gain

Q18. Hartley oscillator is commonly used in a

1. TV receivers
2. Radio transmitters
3. Radio Receivers

4. TV transmitters

Q19. The advantage of bridge rectifier over full wave rectifier is

1. Higher Average current
2. Lower PIV (Peak Inverse Voltage)
3. Lower ripple factor
4. Higher efficiency

Q20. An amplifier without feedback has a gain of 100 ± 10 and negative feedback is provided such that the gain variations remain within 0.2%. **Then the amount of feedback β is given as**

1. 0.1
2. 0.9
3. 0.49
4. 0.25

Q21. When three amplifiers each if bandwidth $\mathbf{f_H = 20kHz}$ are cascaded the overall bandwidth becomes

1. 19.6 kHz
2. 39.23 kHz
3. 10.2 kHz
4. 20 kHz

Q22. Negative feedback is generally used in

1. Oscillators
2. Comparator

3. Amplifiers
4. Multivibrator

Q23. The power amplifier which is having Maximum distortion is

1. A
2. B
3. C
4. AB

Q24. The control signal of a sample and hold circuit is applied to the-

1. Triac
2. Silicon Controlled Rectifier
3. Diac
4. MOS

Q25. UV radiation is used in which process of IC fabrication?

1. Diffusion
2. Masking
3. Ion Implantation
4. Oxidation

Q26. Which of the following statement is false regarding Common Collector amplifier

1. Output is taken from the emitter terminal
2. Input and output signals are in phase

3. Input resistance is high
4. Voltage gain is relatively high

Q27. An FET is a better chopper than a BJT because it has

1. Lower Off-set voltage
2. Lower gain and bandwidth product
3. Lower input current
4. Higher input impedance

Q28. For a tuned radio – frequency applications generally we use

1. Class A amplifier
2. Class C amplifier
3. Class AB amplifier
4. Class B amplifier

Q29. To obtain very High Input and Low Output Impedances in a feedback amplifier, the topology mostly used is

1. Voltage Series Feedback
2. Current Series Feedback
3. Voltage Shunt Feedback
4. Current Shunt Feedback

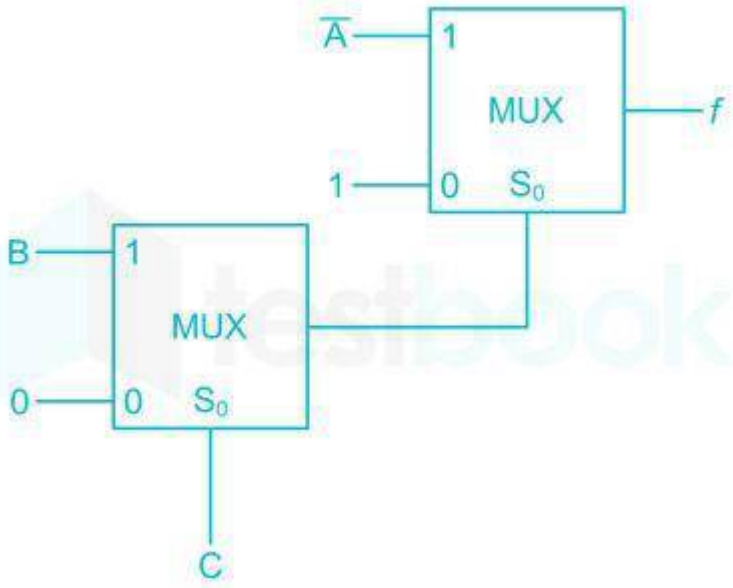
Q30. Three identical RC coupled amplifiers each having a lower cut – off frequency f is cascaded with negligible loading. What is the lower cut – off frequency of the overall amplifier?

1. $\frac{f}{\sqrt{2^{\frac{1}{3}}-1}}$
2. $f\sqrt{2^{\frac{1}{3}}-1}$
3. $\frac{f}{3}$
4. 3f

Q31. The full scale output of a 10 – bit DAC is 5V. the resolution is

1. 5 mV
2. 10 mV
3. 2.5 mV
4. 20 mV

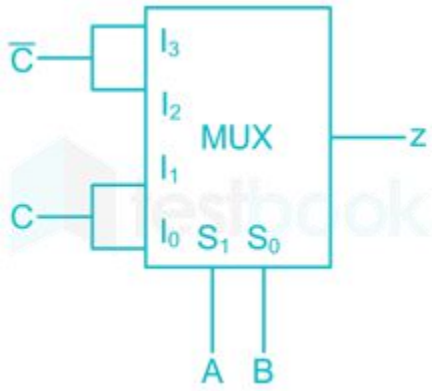
Q32. The network shown below implements.



1. NOR gate

2. NAND gate
3. XOR gate
4. XNOR gate

Q33. The MUX shown below is a 4 × 1 multiplexer. The output Z is



1. $A \oplus C$
2. $A \odot C$
3. $B \oplus C$
4. $B \odot C$

Q34. It is required to construct a 2^n to 1 multiplexer by using 2 to 1 multiplexers only. How many of 2 to 1 multiplexers are needed?

1. 2
2. 2^{2n}
3. 2^{n-1}
4. $2^n - 1$

Q35. The parity of binary number 11001110

1. is even
2. is not known
3. is odd
4. is as the number of zeros

Q36. With which decoder it is possible to obtain many code conversions?

1. 2 line to 4 line decoder
2. 3 line to 8 line decoder
3. Not possible with any decoder
4. 4 line to 16 line decoder

Q37. Two of the four synchronous modes of operation of clocked JK flip flops are SET, HOLD. The other two are

1. PRESET and CLEAR
2. PRESET and RESET
3. PRESET and TOGGLE
4. RESET and TOGGLE

Q38. The decimal equivalent of hexadecimal number 2A0F is

1. 17670
2. 17607
3. 17067
4. 10767

Q39. Given the logical function of four variables

$f(A, B, C, D) = (\overline{A} + BC)(B + CD)$

The function as a sum of product will be

1. $\overline{A}B + BC + \overline{A}CD + BCD$
2. $AB + A\overline{B} + A\overline{C}D + BCD$
3. $AB + \overline{AB} + \overline{A}CD + B\overline{C}D$
4. $A\overline{B} + \overline{A}B + \overline{A}CD + BCD$

Q40. If $\overline{x} \times \overline{y} = 0$, then which one of the following is true?

1. $\overline{xy} + \overline{y}x + xz = x\overline{y} + yz$
2. $\overline{xyz} + xyz = xy\overline{z} + \overline{xyz}$
3. $\overline{x}y + \overline{y}x = xy + \overline{xy}$
4. $\overline{x}yz = 1$

Q41. A 4-bit modulo 16 ripple counter uses JK flip flop. If the propagation delay of each flip flop is 50 ns, The maximum clock frequency that can be used is

1. 20 MHz
2. 10 MHz
3. 5 MHz
4. 4 MHz

Q42. Logic 1 in positive logic system is represented by

1. zero level
2. lower voltage level

3. higher voltage level
4. negative voltage

Q43. Synchronous counters eliminate the delay problems encountered with asynchronous (ripple) counter because the

1. Input clock pulses are applied only to the first and the last stages
2. Input clock pulses are applied only to the last stage
3. Input clock pulses are not used to activated any of the counter stages
4. Input clock pulses are applied simultaneously

Q44. The Boolean expression reduces to $F = \overline{A + \overline{B} + C} + \overline{\overline{A} + \overline{B} + C} + \overline{A + \overline{B} + \overline{C}} + ABC$ reduces to

1. A
2. B
3. C
4. A + B + C

Q45. What are the values respectively, of $R_1 and R_2$ in the expression $(235)_{R_1} = (565)_{10} = (1065)_{R_2}$?

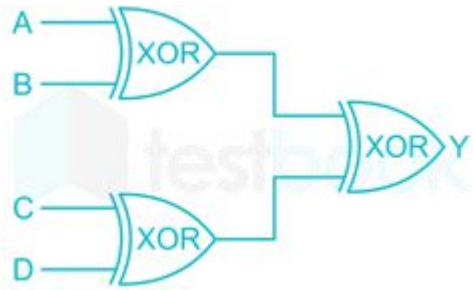
1. 8, 16
2. 16, 8
3. 6, 16
4. 12, 8

Q46. Which one of the following statements in not correct?

Conversion of EXCESS-3 code to BCD can be achieved by using

1. Discrete gates
2. 4 : 16 de-multiplexer
3. A 4 bit full adder
4. A 4 bit half adder

Q47. A, B, C and D are input, and Y is the output bit in the XOR gate circuit of the figure below. Which of the following statements about the sum S of A, B, C, D and Y is correct?



1. S is always with zero or odd
2. S is always either zero or even
3. S = 1 only if the sum of A, B, C and D is even
4. S = 1 only if the sum A, B, C and D is odd

Q48. A cary look ahead adder is frequently used to addition because it

1. is faster
2. is more accurate
3. uses fewer gates
4. costs less

Q49. The reduced form of the Boolean expression

$A[B + C(\overline{AB + AC})]$

1. $\overline{A}B$
2. $A\overline{B}$
3. AB
4. $AB + A\overline{C}$

Q50. Consider the following:

Any combination circuit can be built using

NAND gates

2. NOR gates

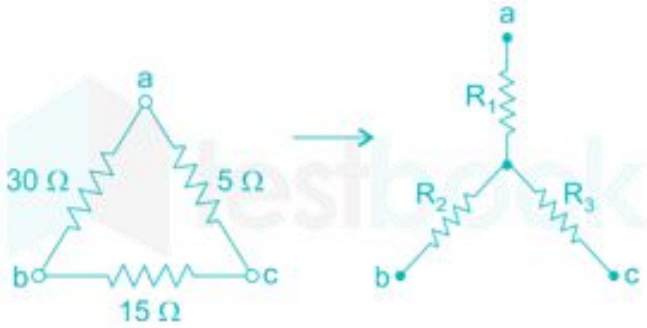
3. EX – OR gates

4. Multiplexers

Which of these are correct?

1. 1, 2 and 3
2. 1, 3 and 4
3. 2, 3 and 4
4. 1, 2 and 4

Q51. A Delta – connected network with its Wye-equivalent is shown in figure. The resistance $R_1, R_2 \text{and } R_3$ (in ohms) are respectively



1. 1.5, 3 and 9
2. 3, 9 and 1.5
3. 9, 3 and 1.5
4. 3, 1.5 and 9

Q52. For two two-port networks have their inputs in series connection and their outputs in parallel connection. Which of the following is true about the network?

1. The overall z parameter is the sum of individual z parameter matrices.
2. The overall y parameter is the sum of individual y parameter matrices.
3. The overall h parameter is the sum of individual h parameter matrices.
4. The overall ABCD parameter is the product of individual ABCD parameter matrices.

Q53. If the scattering matrix [S] of a two port network is

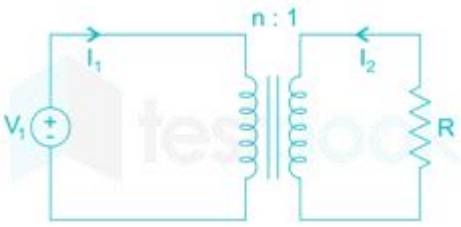
$$[\mathbf{S}] = \begin{bmatrix} \mathbf{0.1\angle 0^\circ} & \mathbf{0.9\angle 90^\circ} \\ \mathbf{0.9\angle 90^\circ} & \mathbf{0.1\angle 90^\circ} \end{bmatrix}$$

Then the network is

1. lossless and reciprocal
2. lossless but not reciprocal
3. not lossless but reciprocal

4. neither lossless nor reciprocal

Q54. For the ideal transformer shown below, the input impedance $\frac{V_1}{I_1}$ is



1. nR
2. n^2R
3. $\frac{R}{n^2}$
4. $\frac{R}{n}$

Q55. If P_m is the maximum power transferred, then loss of the system is

1. $\frac{P_m}{4}$
2. $\frac{P_m}{2}$
3. $\frac{3P_m}{4}$
4. P_m

Q56. A $4\mu F$ capacitor is charged by a constant current $2\mu A$ for $6sec$. The voltage across the capacitor at the end of the charging interval will be

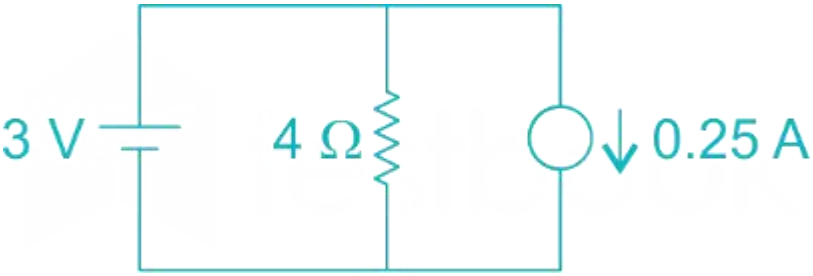
1. 2V
2. 3V
3. 4V

4. 0.5V

Q57. The peak value of a sine wave is 200 V. Its average value is

1. 127.4 V
2. 141.4 V
3. 282.8 V
4. 200 V

Q58. The current flowing through the voltage source in the circuit shown is



1. 1.0 A
2. 0.75 A
3. 0.5 A
4. 0.25 A

Q59. A series RLC circuit resonates at 1000 kHz. At frequency of 1005 kHz, the circuit impedance is

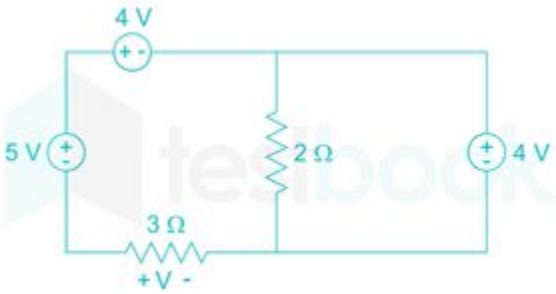
1. Resistive
2. Capacitive
3. Inductive

4. Minimum

Q60. Superposition theorem can be applied only to circuits having _____ elements.

1. Non-linear
2. Passive
3. Linear bilateral
4. Resistive

Q61. The voltage V in the following figure is equal to



1. 3 V
2. -3 V
3. 5 V
4. None of the above

Q62. The ratio of resistances of a 100 W, 220 V lamps to that of a 100 W, 110 V lamps will be at respective voltages

1. 4
2. 2
3. ½

4. ¼

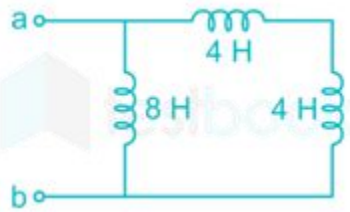
Q63. An active element is circuit is

1. Voltage source
2. Resistance
3. Capacitor
4. Inductor

Q64. Transient current in a circuit results from

1. Voltage applied to the circuit
2. Impedance of the circuit
3. Resistance of the circuit
4. Changes in the stored energy in inductors and capacitors

Q65. Equivalent Inductance of the circuit at terminals a-b is



1. 4 H
2. 16 H
3. 8 H
4. 6 H

Q66. An inductor at time t = 0+, with non-zero initial current act as a

1. Short circuit
2. Open circuit
3. Constant current source
4. Constant voltage source

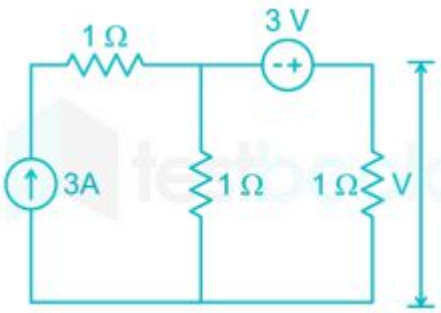
Q67. Resistance of earth should be

1. Infinite
2. Medium
3. Low
4. The minimum possible

Q68. Phase difference between the two wave forms can be compared only when they have the same.

1. Frequency
2. Peak value
3. Effective value
4. RMS Value

Q69. The value of Voltage across 3A current source in the circuit shown in below is



1. 1 V
2. 2 V
3. 3 V
4. 4 V

Q70. In the given circuit, voltage across capacitor C at time $t = \infty$ is

1. 5 V
2. 10 V
3. 2.5
4. Zero

Q71. If the number of bits per sample in a PCM system is increased from n to n+1, then quantization noise power becomes

1. Half
2. Two times
3. One fourth
4. Four times

Q72. The power spectral density of a deterministic signal is given by $(\frac{\sin f}{f})^2$ where f is frequency. The auto correlation function of this signal in the time domain is

1. A rectangular pulse
2. A delta function
3. A sine pulse
4. A triangular pulse

Q73. A sinusoidal signal with peak-to-peak amplitude of 1.536 V is quantized into 128 levels using a mid-rise uniform quantizer. The quantization-noise power is

1. 0.768 V
2. 48 × 10-6 V2
3. 12 × 10-6 V2
4. 3.072 V

Q74. If the carrier of a 100 percent modulated AM wave is suppressed, the percentage power saving will be

1. 50
2. 66.66
3. 100
4. 150

Q75. A random process obeys Poisson's distribution. It is given that the mean of the process is 5. Then the variance of the process is

1. 5
2. 0.5
3. 25

4. 0

Q76. A sinusoidal signal with peak-to-peak amplitude of 1.536 V is quantized into 128 levels using a mid-rise uniform quantizer. The quantization-noise power is

1. 0.786 V
2. $48 \times 10^{-6} V^2$
3. $12 \times 10^{-6} V^2$
4. 3.072 V

Q77. The bandwidth, $\mathbf{BW}$ of $\mathbf{ASK}$, $\mathbf{PSK}$ and $\mathbf{FSK}$ for the same bit rate $\mathbf{R_b}$ follows which of the following inequalities:

1. $\mathrm{BW_{bASK}} = \mathrm{BW_{bPSK}} > \mathrm{BW_{bFSK}}$
2. $\mathrm{BW_{bASK}} = \mathrm{BW_{bPSK}} > \mathrm{BW_{bFSK}}$
3. $\mathrm{BW_{bASK}} = \mathrm{BW_{bPSK}} < \mathrm{BW_{bFSK}}$
4. $\mathrm{BW_{bASK}} = \mathrm{BW_{bPSK}} = \mathrm{BW_{bFSK}}$

Q78. We have the carrier power and message signal power given as $\mathbf{P_c}$ and $\mathbf{P_m}$ respectively. The power of wide band FM generated using the carrier and message signal is

Q79. Two symbols are separated by a minimum euclidean distance, $\mathbf{d_{min}}$ in the signal space, such that the channel is disturbed by an additive white Gaussian noise of power spectral density $\eta/2$ and mean zero. The probability of error is given by

1. $\mathrm{P_e} = \mathrm{Q}\left(\sqrt{\frac{\mathrm{d_{min}^2}}{\eta}}\right)$
2. $\mathrm{P_e} = \mathrm{Q}\left(\sqrt{\frac{2\mathrm{d_{min}^2}}{\eta}}\right)$

3. $P_e = Q(\sqrt{\frac{d_{min}^2}{2\eta}})$

4. $P_e = Q(\sqrt{\frac{d_{min}^2}{4\eta}})$

Q80. The main advantage of DM over PCM is –

1. Less bandwidth
2. Less power
3. Better S/N ratio
4. Simple circuitry

Q81. Figure of merit is always unity in –

1. SSB – SC
2. AM
3. FM
4. All of these

Q82. The main advantage of super heterodyne receiver is –

1. Simple circuit
2. Better tracking
3. Improvement in selectivity and sensi
4. Better alignment

Q83. Four voice signals, each limited to 4 kHz and sampled by Nyquist rate are converted into binary PCM using 256 quantization levels. The bit transmission rate for the time division multiplexed signal will be –

1. 8 kbps
2. 64 kbps
3. 256 kbps
4. 512 kbps

Q84. An analog signal is sampled at 36 kHz and quantized into 256 levels. The time duration of a bit of the binary coded signal is –

1. $5.78\ \mu s$
2. $3.47\ \mu s$
3. 6.43 ms
4. 7.86 ms

Q85. If carrier modulated by a digital bit stream had one of the possible phases of 0, 90, 180 and 270 degrees, then the modulation is called

1. BPSK
2. QPSK
3. QAM
4. MSK

Q86. $\mathbf{g(t) = 5\cos(10^6\pi t)\sin(10^3\pi t)}$ represents

1. DSB suppressed carrier signal
2. AM signal
3. SSB upper sideband signal
4. Narrow band FM signal

Q87. A carrier voltage of unmodulated carrier power 1 kW on being amplitude modulated by an audio sinusoidal voltage to a depth of 100% has total modulated carrier power of

1. 1.25 kW
2. 1.5 kW
3. 2 kW
4. 4 kW

Q88. A band limited signal when sampled is represented as $f_s(t)$. Its frequency spectrum will show no overlaps if the sampling time is

1. $\leq \frac{1}{f_{max}}$
2. $\geq \frac{1}{f_{max}}$
3. $\leq \frac{1}{2f_{max}}$
4. $\geq \frac{1}{2f_{max}}$

Q89. If the transmission bandwidth is doubled in FM, then the figure of merit (FOM) is

1. Also doubled
2. Improved four fold
3. Improved four fold
4. Unaffected

Q90. If the number of bits per sample in a PCM system is increased from n to n + 1, the improvement in signal-to-quantisation noise ratio will be

1. 3 dB
2. 6 dB
3. 2n dB
4. n dB

Q91. For transmission of normal speech signal, the PCM channel needs a bandwidth

1. 64 kHz
2. 16 kHz
3. 8 kHz
4. 32 kHz

Q92. In a PCM system, signal is sampled at a rate f_s and the number of pulses in one code-group is p. then the number of pulses per second is

1. f_s
2. pf_s
3. f_s/p
4. p/f_s

Q93. PPM may be converted into PWM by using

1. Monostable multivibrator
2. Bistable multivibrator
3. Astable multivibrator
4. Integrator

Q94. Practical bandwidth of a narrow band FM signal $(\beta < 1)$ equals

1. f_m
2. $2f_m$
3. f_d
4. $2f_d$

Q95. Which of the following statements is not true for FM?

1. Carrier component never becomes zero
2. J-coefficients occasionally are negative
3. Total power remains constant in-spite of change of modulation index
4. Total bandwidth increases with increase in modulation index

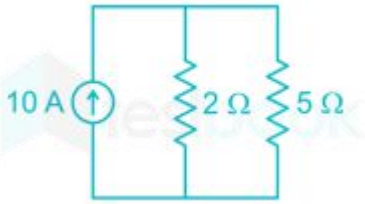
Q96. The current flowing through a time varying capacitor having voltage "V" equals to

1. $\frac{d}{dt}(CV)$
2. $C\frac{d}{dt}(V)$
3. $\frac{1}{2}CV^2$
4. $\frac{1}{C}\int_{\infty}^{t} Vdt$

Q97. The power factor of an AC circuit is given by:

1. $\frac{R}{Z}$
2. $\frac{X_L}{R}$
3. $\frac{Z}{R}$
4. $\frac{R}{X_L}$

Q98. Find the current through 5 Ω resistor is



1. 3.5 A
2. 7.15 A
3. 5 A
4. 2.85 A

Q99. The RMS value of the alternating current given by the equation

$$\mathbf{i = 50sin(314t - 10^{\circ}) + 30sin(157t - 20^{\circ})}$$

1. 41.23 A
2. 58.31 A
3. 38.73 A
4. 77.43 A

Q100. For RLC Series circuits at resonance the current is

1. Minimum at leading power factor
2. Minimum at lagging power factor
3. Maximum at unity power factor
4. Maximum at leading power factor