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प्रश्न पुस्तिका / QUESTION BOOKLET

विषय / Subject :

Electronics Engineering

कोड / Code : 07

पुस्तिका में पृष्ठों की संख्या /
Number of Pages in Booklet : 16

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Electronics Engineering
07 विषय कोड
A बुकलेट सीरीज

पुस्तिका में प्रश्नों की संख्या /
Number of Questions in Booklet : 100

समय / Time : 2 घंटे / Hours

पूर्णांक / Maximum Marks : 100

INSTRUCTIONS

1. **Answer all questions.**
2. **All questions carry equal marks.**
3. Only one answer is to be given for each question.
4. If more than one answers are marked, it would be treated as wrong answer.
5. Each question has four alternative responses marked serially as **1, 2, 3, 4**. You have to darken only one circle **or** bubble indicating the correct answer on the Answer Sheet using **BLUE BALL POINT PEN.**
6. **1/3 part of the mark(s) of each question will be deducted for each wrong answer.** (A wrong answer means an incorrect answer **or** more than one answers for any question. Leaving all the relevant circles **or** bubbles of any question blank will not be considered as wrong answer.)
7. The candidate should ensure that Series Code of the Question Paper Booklet and Answer Sheet must be same after opening the envelopes. In case they are different, a candidate must obtain another Question Paper of the same series. Candidate himself shall be responsible for ensuring this.
8. Mobile Phone or any other electronic gadget in the examination hall is strictly prohibited. A candidate found with any of such objectionable material with him/her will be strictly dealt as per rules.
9. Please correctly fill your Roll Number in O.M.R. Sheet. 5 marks will be deducted for filling wrong or incomplete Roll Number.

Warning : If a candidate is found copying or if any unauthorised material is found in his/her possession, F.I.R. would be lodged against him/her in the Police Station and he/she would liable to be prosecuted under Section 3 of the R.P.E. (Prevention of Unfair means) Act, 1992. Commission may also debar him/her permanently from all future examinations of the Commission.

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निर्देश

1. सभी प्रश्नों के उत्तर दीजिए ।
2. सभी प्रश्नों के अंक समान हैं ।
3. प्रत्येक प्रश्न का केवल एक ही उत्तर दीजिए।
4. एक से अधिक उत्तर देने की दशा में प्रश्न के उत्तर को गलत माना जाएगा ।
5. प्रत्येक प्रश्न के चार वैकल्पिक उत्तर दिये गये हैं, जिन्हें क्रमशः 1, 2, 3, 4 अंकित किया गया हैं। अभ्यर्थी को सही उत्तर निर्दिष्ट करते हुए उनमें से केवल एक गोले अथवा बबल को उत्तर–पत्रक पर नीले बॉल प्वाइंट पेन से गहरा करना है ।
6. प्रत्येक गलत उत्तर के लिए प्रश्न अंक का 1/3 भाग काटा जायेगा। गलत उत्तर से तात्पर्य अशुद्ध उत्तर अथवा किसी भी प्रश्न के एक से अधिक उत्तर से है । किसी भी प्रश्न से संबंधित गोले या बबल को खाली छोड़ना गलत उत्तर नहीं माना जायेगा।
7. प्रश्न–पत्र पुस्तिका एवं उत्तर पत्रक के लिफाफे की सील खोलने पर परीक्षार्थी यह सुनिश्चित कर लें कि उसके प्रश्न–पत्र पुस्तिका पर वही सीरीज अंकित है जो उत्तर पत्रक पर अंकित है। इसमें कोई भिन्नता हो तो वीक्षक से प्रश्न–पत्र की ही सीरीज वाला दूसरा प्रश्न–पत्र का लिफाफा प्राप्त कर लें। ऐसा न करने पर जिम्मेदारी अभ्यर्थी की होगी।
8. मोबाईल फोन अथवा इलेक्ट्रोनिक यंत्र का परीक्षा हॉल में प्रयोग पूर्णतया वर्जित हैं। यदि किसी अभ्यर्थी के पास ऐसी कोई वर्जित सामग्री मिलती है तो उसके विरुद्ध आयोग द्वारा नियमानुसार कार्यवाही की जायेगी।
9. कृपया अपना रोल नम्बर ओ.एम.आर. पत्रक पर सावधानी पूर्वक सही भरें। गलत अथवा अपूर्ण रोल नम्बर भरने पर 5 अंक कुल प्राप्तांकों में से अनिवार्य रूप से काटे जाएंगे।

चेतावनी : अगर कोई अभ्यर्थी नकल करते पकड़ा जाता है या उसके पास से कोई अनधिकृत सामग्री पाई जाती है, तो उस अभ्यर्थी के विरुद्ध पुलिस में प्राथमिकी दर्ज कराई जायेगी और आर. पी. ई. (अनुचित साधनों की रोकथाम) अधिनियम, 1992 के नियम 3 के तहत कार्यवाही की जायेगी। साथ ही आयोग ऐसे अभ्यर्थी को भविष्य में होने वाली आयोग की समस्त परीक्षाओं से विवर्जित कर सकता है।

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1 The magnetic susceptibility of a paramagnetic is

(1) less than zero
(2) less than one but positive
(3) greater than one
(4) equal to zero

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2 In a series RLC circuit at resonance

(1) Impedance is maximum
(2) admittance is maximum
(3) impedance is purely reactive
(4) current is minimum

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3 The type of by-pass capacitor that work best at high frequencies is

(1) electrolytic
(2) mica
(3) ceramic
(4) plexiglass

4 The main function of the grounding system in an industrial plant is to provide protection against

(1) internal shorts
(2) over-voltages
(3) static electricity from friction
(4) insulation breakdown

5 The relation AD-BC=1 where A, B, C and D are the elements of a transmission matrix of a network is valied for

(1) any type of network
(2) passive but not reciprocal network
(3) passive and reciprocal network
(4) both active and passive network

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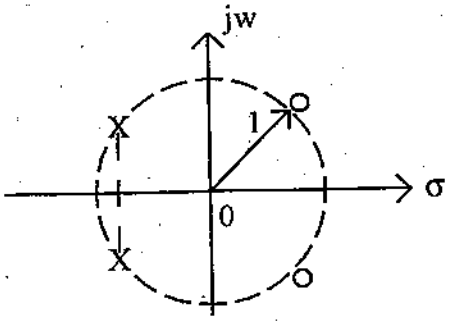
6 The pole-zero pattern shown in the given figure is for



(1) a low-pass filter
(2) a high-pass filter
(3) a band-pass filter
(4) an all-pass filter

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7 Frequency response of the function $T(s) = \frac{s+1}{s+2}$ exhibits a maximum phase at a frequency (in radian/sec)

(1) 0 (2) $\frac{1}{\sqrt{2}}$

(3) $\sqrt{2}$ (4) θ

8 The common voltage across parallel branches with different voltage sources can be determined by

(1) Superposition theorem (2) Thevenin's theorem

(3) Norton's theorem (4) Millman's theorem

9 IC 741 operational amplifier has typical gain of

(1) 110 dB (2) 100 dB

(3) 106 dB (4) 90 dB

10 The output waveform of phase Locked Loop 566 is

(1) Square and triangular

(2) Square and sine wave

(3) Triangular and sine wave

(4) None of the above

11 The basic important blocks of IC 555 timer

(1) Voltage source (2) Flip-flop

(3) Resistors (4) Switch

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12 Which of the following system is linear ?

(1) Log amplifier (2) I to V converter

(3) V to I converter (4) All of the above

13 The technique used to produce small-device pattern on silicon wafer is

(1) Photolithography (2) Oxidation

(3) Diffusion (4) epitaxy

14 Picture information in TV signals is transmitted by

(1) AM (2) FM

(3) PAM (4) PCM

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15 The dominant mode in a cylindrical waveguide is

(1) TM_{11} (2) TE_{11}

(3) TE_{01} (4) TEM_{11}

16 The colour TV system to be adopted in India is

(1) NTSC

(2) SECAM

(3) PAL-B

(4) CCIR

17 Antenna commonly used for microwave links are

(1) loop antenna

(2) log-periodic antenna

(3) parabolic antenna

(4) rhombic antenna

18 Crystals used in oscillator circuits for the purpose of stabilizing frequency are made of

(1) quartz

(2) silicon

(3) germanium

(4) some other semiconductor material

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19 A pre-emphasis circuit provides extra noise immunity by

(1) Boosting the bass frequencies

(2) Amplifying the higher audio frequencies

(3) Pre-amplifying the whole audio band

(4) Convertig PM to FM

20 Short circuited stubs are preferred to open-circuited stubs because the latter are

(1) more difficult to make and connect

(2) made of a transmission line with a different Z_o

(3) liable to radiate

(4) incapable of giving a full range of reactance

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21 One of the main function of the RF amplifier stage in a super-hetrodyne receiver is to
(1) provide improved tracking
(2) permit better adjacent channel rejection
(3) increase the tuning range of the receiver
(4) improve image signal rejection

22 The uplink and downlink frequencies are made different in satellite links to
(1) reduce transmitter power
(2) increase the isolation between the satellite transmitter and receiver
(3) reduce antenna size
(4) increase solar panel size

23 The number of frames per second in our TV system is
(1) 50 (2) 24
(3) 25 (4) 30

24 Geo-stationary satellite is locted above earth's surface at a height of
(1) 6000 kms (2) 36000 kms
(3) 3600 kms (4) None of these

25 In a PCM system, non-uniform quantization leads to
(1) reduce bandwidth
(2) simplification of the quantization process
(3) increased SNR for low level signals
(4) increased SNR for high level signals

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26 20 dB/deade corresponds to
(1) 3 dB/octave (2) 6 dB/octave
(3) 9 dB/octave (4) 20 dB/octave

27 A second order differential equation is given by $\frac{d^2x}{dt^2}+5\frac{dx}{dt}+7x=7y$. the undamped natural frequency (rad/sec) and damping ratio are
(1) 1, 5.3 (2) 5, 7
(3) 1, $\sqrt{7}$ (4) $\sqrt{7}$, 0.94

28 For a closed loop system whose transfer function is $G(s)H(s)=\frac{K\cdot e^{sT}}{s(s+1)}$, determine the maximum value of the gain 'K' for stability
(1) $-1/T < K > 1/T$ (2) $K = 1/T$
(3) $K > 1/T$ (4) $0 < K < 1/T$

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29 In the root locus for open loop transfer function $G(s)H(s)=\frac{k(s+6)}{(s+3)(s+5)}$, the break away and break in points are located respectively at

(1) –2 and –1 (2) –2.47 and –3.77

(3) –4.27 and –7.73 (4) –7.73 and –4.27

30 The main draw-back of a feedback system is

(1) inaccuracy (2) inefficiency

(3) insensitivity (4) instability

31 The principles of homogeneity and superposition can be applied to

(1) linear time-invarient systems

(2) linear time varient systems

(3) nonlinear time invarient systems

(4) nonlinear time varient systems

32 The rise time t_r for a type-I second order system equals

(1) $\frac{\pi-\tan^{-1}\left(\frac{\sqrt{1-\delta^2}}{\delta}\right)}{w_n\sqrt{1-\delta^2}}$ (2) $\frac{\pi-1}{w_n\sqrt{1-\delta^2}}$

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(3) $\frac{\pi-\cos^{-1}\delta}{w_n\sqrt{1-\delta^2}}$ (4) $\frac{\tan^{-1}\left(\sqrt{1-\delta^2}/\delta\right)}{w_n\sqrt{1-\delta^2}}$

33 Which of the following system is generally preferred

(1) underdamped (2) overdamped

(3) critically damped (4) oscillatory

34 Transfer function of a system is $\frac{100(1+0.25s)}{(1+0.5s)}$. The corner frequencies will be

(1) –4 and –2 (2) 4 and 2

(3) 0.25 and 0.5 (4) –0.25 and –0.5

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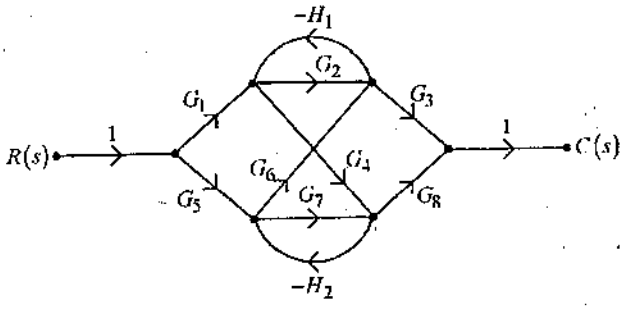
35 In the case of the signal flow graph shown in figure, the number of forward paths and the individual loops will be respectively



(1) 4 and 2
(2) 5 and 3
(3) 6 and 2
(4) 6 and 3

36 The wave radiated by a helical antenna is

(1) linearly polarised
(2) right circularly polarised
(3) left circularly polarised
(4) elliptically polarised

37 Gauss law relates the electric field intensity $\vec{E}$ with the volume charge density 'ρ'

(1) $\nabla \times \vec{E} = \varepsilon_0 \cdot \rho$
(2) $\nabla \cdot \vec{E} = \varepsilon_0 \cdot \rho$
(3) $\nabla \times \vec{E} = \rho / \varepsilon_0$
(4) $\nabla \cdot \vec{E} = \rho / \varepsilon_0$

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38 The input impedance of a $\lambda/8$ long short-circuited section of a lossless transmission line is

(1) Zero
(2) inductive
(3) capacitive
(4) infinite

39 A generator of 50 Ω internal impedance and operating at 16 Hz feeds a 75 Ω load via a coaxial line of characteristic impedance 50 Ω. The voltage standing wave ratio on the feed line is

(1) 0.5
(2) 1.5
(3) 2.5
(4) 1.75

40 The input impedance of short-circuited lossless line of length less than a quarter wavelength is

(1) purely resistive
(2) purely inductive
(3) purely capacitive
(4) complex

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41 A digital voltmeter has read-out range from 0 to 9999 counts when full scale rading is 9.999 V, the resolution of the full scale reading is

(1) 0.001 (2) 1000

(3) 2 digit (4) 1 mV

42 In a setup for the determination of self capacitance of a coil, the standard variable capacitor has value of 460 pF at 2 MHz and a value of 100 pF at 4 MHz. The coil seft capacitance is

(1) 2 pF (2) 20 pF

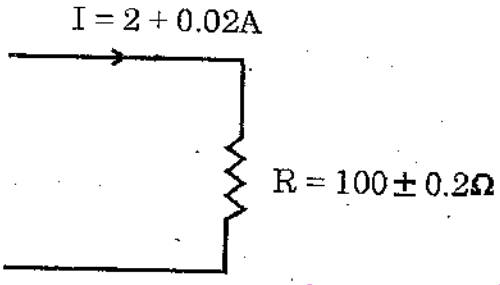
(3) 60 pF (4) 200 pF

43 The percentage limiting error, in the case of an instrument reading of 8.3V with a 0 to 150 V having a guaranteed accuracy of 1% full scale reading is

(1) 1.807% (2) 0.181%

(3) 18.07% (4) 0.0018%

44 The current flowing through the resistor 'R' is as shown in figure. The computed value of power is



(1) 400 ± 0.02 W (2) 400 ± 4.60 W

(3) 400 ± 8.8 W (4) 400 ± 10.65 W

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45 Thermistors are made of

(1) pure metals (2) pure insulators

(3) sintered mixtures of metallic oxides (4) pure semiconductor

46 The working principle of gauge is based on

(1) combustibility of the medium

(2) thermal conductivity of the medium

(3) humidity of the medium

(4) electrical conductivity of the medium

47 The piezoelectric crystal voltage sensitivity is defined as

(1) Voltage developed per unit stress (2) field developed per unit stress

(3) voltage developed per unit force (4) field developed per unit force

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48 The most useful transducer for displacement sensing with excellent sensitivity, linearity and resolution is

(1) an incremental encoder
(2) an absolute encoder
(3) a LVDT
(4) a strain gauge

49 A dual-trace CRO has

(1) one electron gun
(2) two electron gun
(3) one electron gun and one two-pole switch
(4) two electron gun and one two pole switch

50 The resolution of N-bit system D/A converter is

(1) $1/2^N$
(2) $1/(2^N-1)$
(3) 2^N-1
(4) 2^N

51 A PIN diode is suitable for use as a

(1) microwave switch
(2) microwave detector
(3) microwave mixer diode
(4) none of the above

52 A ferrite is

(1) a non-conductor with magnetic properties
(2) a microwave semiconductor
(3) an inter-metallic compound with particular good conductivity
(4) an insulator which heavily attenuates magnetic fields

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53 Klystron operates on the principle of

(1) amplitude modulation
(2) frequency modulation
(3) pulse modulation
(4) velocity modulation

54 Typical material thickness in micro-strip is

(1) 0.001 mm to 0.01 mm
(2) 0.01 mm to 0.1 mm
(3) 0.1 mm to 1.5 mm
(4) 1 mm to 5 mm

55 Which of the following flip-flops is used as universal flip-flop

(1) HJ flip-flop
(2) D flip-flop
(3) RS flip-flop
(4) T flip-flop

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56 How many lines are there in address bus of 8085 microprocessor ?
(1) 6 (2) 8
(3) 12 (4) 16

57 Which logic family is the fastest logic in all logic families ?
(1) TTL (2) NMOS
(3) CMOS (4) ECL

58 The number of full adders in a 4-bit parallel adder will be
(1) two (2) three
(3) four (4) six

59 A schmitt trigger is a digital circuit that produces
(1) rectangular output when the input is sinusoidal
(2) Sinusoidal output when the input is rectangular
(3) Square output for the trapezoidal input
(4) rectangular output regardless of the input waveform

60 Race condition always arises in
(1) synchronous circuit
(2) asynchronous circuit
(3) combinational circuit
(4) Encoder circuit

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61 A buffer is a device that has
(1) a high input impedance and a low output impedance
(2) a high input as well as output impedance
(3) a low input impedance and a high output impedance
(4) a low input impedance as well as output impedance

62 Which code is used to map the digital datas in K-map for simplification ?
(1) Binary code (2) Excess-3 code
(3) ASCII code (4) Gray code

63 How many minimum number of univesal gates requires to realize the EX-OR gate ?
(1) 2 (2) 3
(3) 4 (4) 5

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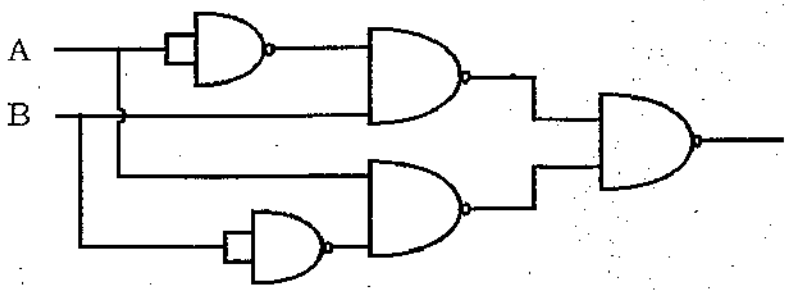
64 The figure of merit of a logic family is given by

(1) gain × bandwidth
(2) propagation delay time × power dissipation
(3) fan-out × propogation delay time
(4) noise margin × power dissipation

65 The circuit shown in the figure is functionally equivalent to



(1) NOR gate
(2) OR gate
(3) EX-OR gate
(4) NAND gate

66 A microprogram

(1) is usually written in high level language
(2) is a sequencing program for the control unit of any processor
(3) is a program for microcomputers
(4) is a program written in assembly language

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67 Which of the following translator program converts assembly language program to object program ?

(1) assembler
(2) compiler
(3) macroprocessor
(4) linker

68 Which of the following is used as storage locations both in the ALU and the control section of a computer ?

(1) accumulator
(2) register
(3) adder
(4) decoder

69 A 32-bit microprocessor has word length equal to

(1) 2 bytes
(2) 1 byte
(3) 4 bytes
(4) 8 bytes

70 In fullwave rectifier, the lowest ripple frequency is

(1) f/2
(2) f
(3) 2f
(4) 3f

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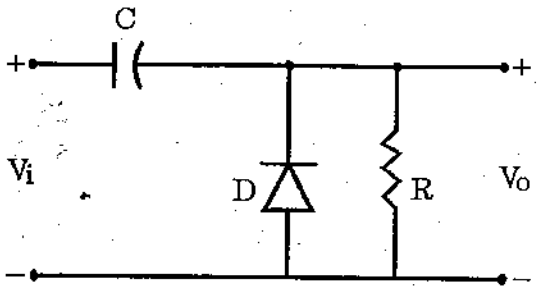
71 The snubber circuit for an SCR is required as a protection against breakdown due to

(1) Low voltage
(2) High voltage
(3) rate of change of applied forward voltage
(4) rate of change of current

72 Bootstrap voltage sweep generator uses

(1) negative feedback
(2) positive feedback
(3) both negative and positive feedbacks simultaneously
(4) no feedback

73 The circuit shown in the figure is a



(1) positive clamper
(2) negative clamper
(3) positive clipper
(4) negative clipper

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74 A power transistor used in a class A amplifier has zero signal power dissipation of 10 Watts. Calculate collector efficiency

(1) 60%
(2) 30%
(3) 90%
(4) 40%

75 A silicon wafer is doped with phosphorus of concentration 10^{13} atoms/cm^3. If all the donor atoms are active, what is its resistivity at room temperature ? The electron mobility is 1200 cm^2/volt-sec charge on the electron is 1.6×10^{-19} coulomb

(1) 3.2 $\Omega - cm$
(2) 9.2×10^2 $\Omega - cm$
(3) 7.2×10^5 $\Omega - cm$
(4) 5.2×10^2 $\Omega - cm$

76 The distortion in an amplifier is found to be 3%, when the feedback ratio of negative feedback amplifier is 0.04. When the feedback is removed, the distortion becomes 15%. Find open and closed loop gain

(1) 0.2
(2) 20
(3) 50
(4) 100

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77 The ratio of the parallel to series resonant frequencies of crystal is approximately given by :

Where C_m = mounting capacitance

(1) $\frac{f_p}{f_s} \approx 1+\frac{C}{2C_m}$ (2) $\frac{f_p}{f_s} \approx 1+\sqrt{\frac{C}{2C_m}}$

(3) $\frac{f_p}{f_s} \approx \frac{C}{2C_m}$ (4) $\frac{f_p}{f_s} \approx \sqrt{\frac{C}{2C_m}}$

78 Short circuit CE current gain of transistor is 25 at a frequency of 2MHz if f_β = 200 KHz, calculate h_{fe}

(1) 50 MHz (2) 100 MHz
(3) 250 MHz (4) 25 MHz

79 The bandwidth for double tuned amplifier is 20 KHz. Calculate the bandwidth if such three stages are cascaded

(1) 7.14 KHz (2) 14.28 KHz
(3) 21.42 KHz (4) 28.56 KHz

80 For a transformer, the load connected to the secondary has an impedance of 8 Ω. Its reflected impedance on primary is observed to be 648 Ω. Calculate the turn ratio.

(1) 1 : 9 (2) 9 : 1
(3) 1 : 19 (4) 19 : 1

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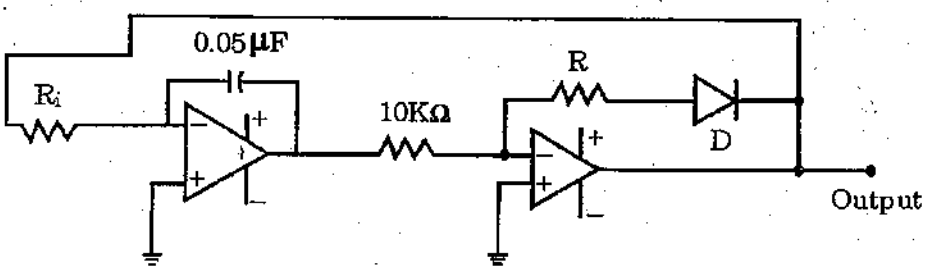
81 The op-amp based circuit shown in figure is used as a



(1) square wave generator
(2) symmetrical triangular wave generator
(3) phase shifter circuit
(4) differential amplifier circuit

82 In ideal op-amp the current through the virtual ground is

(1) 1 A (2) 10 A
(3) Zero (4) infinity

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07

83 Which of the following devices does not have negative resistance characteristics

(1) UJT (2) Tunnel diode
(3) SCR (4) FET

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84 Avalanche breakdown in a semiconductor diode occurs when

(1) the potential barrier is reduced to zero
(2) forward current exceeds a certain value
(3) forward bias exceeds a certain value
(4) reverse bias exceeds a certain value

07

85 Mnemonic codes and variable names are used in

(1) a machine language (2) an assembly language
(3) a high-level language (4) all of these

86 Slowest sorting procedure is

(1) quick sort (2) heap sort
(3) shell sort (4) bubble sort

87 C programming language provides operations which deal directly with objects such as

(1) strings and sets
(2) lists and arrays
(3) characters, integers and floating point numbers
(4) all of these

88 A power MOSFET is

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(1) voltage controlled device
(2) current controlled device
(3) ratio of ripple of frequency to line frequency is higher
(4) peak inverse voltage across the diode is lower

89 The turn-off time of a thyristor is 30 μ sec at 50°C. Its turn-off time at 100°C will be

(1) same (2) 15 μ sec
(3) 60 μ sec (4) 100 μ sec

90 A single-phase one pulse controlled circuit has resistance and counter emf load and 400 sin 314 t as the source voltage for a load counter emf of 200 V, the range of firing angle control will be

(1) 30° to 150° (2) 30° to 180°
(3) 60° to 120° (4) 60° to 180°

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91 The fourier series of an odd periodic function, contains only
(1) odd harmonics (2) even harmonics
(3) cosine terms (4) sine terms

92 The auto correlation function of an energy signal has
(1) no symmetry (2) conjugate symmetry
(3) odd symmetry (4) even symmetry

93 The type of modulation used with direct sequence spread spectrum
(1) PSK (2) ASK
(3) FSK (4) MSK

94 For a DPSK scheme, the bit error probability is given by
(1) $\frac{1}{2} erfc \sqrt{\frac{Eb}{2000}}$ (2) $\frac{1}{2} erfc \frac{Eb}{2000}$
(3) $\frac{1}{2} \exp\left(-\frac{Eb}{No}\right)$ (4) $\frac{1}{2} \exp\left(-\frac{Eb}{2000}\right)$

95 Granular noise is associated with
(1) PCM (2) DPCM
(3) DM (4) QAM

96 A communication channel with AWGN has a BW of 4 KHz and an SNR of 15. Its channel capacity is
(1) 1.6 kbps (2) 16 kbps
(3) 32 kbps (4) 456 kbps

97 A 10 kW carrier is sinusoidally modulated by two carriers corresponding to a modulation index of 30% and 40% respectively. The total radiated power is
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(1) 11.25 kW (2) 12.5 kW
(3) 15 kW (4) 17 kW

98 Companding is used
(1) to overcome quantizing noise in PCM
(2) in PCM, transmitters, to allow amplitude limiting in the receivers
(3) to protect small signals in PCM from quantizing distortion
(4) in PCM receiver, to overcome impulse noise

99 Consider the signal $X_a(t)=10 \cos 2000 \pi t + 5 \cos 10000 \pi t$ is to be sampled. Determine the nyquist rate of this signal is
(1) 4 kHz (2) 20 kHz
(3) 10 kHz (4) 5 kHz

100 Using Z-transform method obtain impulse response of a system described by $Y(n) = 2.5\ Y(n-1) + X(n)$
(1) $h(n) = (25)^n\ u(n)$ (2) $h(n) = (2.5)^n\ u(n)$
(3) $h(n) = (0.25)^n\ u(n)$ (4) $h(n) = 2^n\ u(n-1)$

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SPACE FOR ROUGH WORK

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REVISED KEY ELECTRONICS ENGINEERING (07) 26/06/2013

SET_A	RES
1	2
2	2
3	3
4	3
5	3
6	4
7	3
8	4
9	3
10	1
11	*
12	*
13	1
14	1
15	2
16	3
17	3
18	1
19	2
20	3
21	4
22	2
23	3
24	2
25	3
26	2
27	4
28	2
29	3
30	3
31	1
32	1
33	1
34	2
35	4
36	*
37	4
38	2
39	2
40	2
41	4
42	2
43	3
44	3

SET_A	RES
51	1
52	1
53	4
54	3
55	*
56	4
57	4
58	3
59	4
60	2
61	1
62	4
63	3
64	2
65	3
66	2
67	1
68	2
69	3
70	3
71	3
72	2
73	1
74	*
75	4
76	*
77	1
78	*
79	2
80	2
81	*
82	3
83	4
84	4
85	2
86	4
87	3
88	1
89	3
90	1
91	4
92	2
93	1
94	3

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45	3
46	*
47	2
48	3
49	3
50	2

95	3
96	2
97	1
98	3
99	3
100	2

NOTE : * MEAN DELETED

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