पुस्तिका में पृष्ठों का संख्या : 24
Number of Pages in Booklet : 24

प्रश्न-पत्र पुस्तिका संख्या/
Question Paper Booklet No.

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Paper - II

अधिकतम अंक : 75
Maximum Marks : 75

प्रश्न-पत्र पुस्तिका एवं उत्तर पत्रक के पेपर सील/पॉलिथीन बैग को खोलने पर परीक्षार्थी यह सुनिश्चित कर लें कि उसके प्रश्न-पत्र पुस्तिका पर वही प्रश्न-पत्र पुस्तिका संख्या अंकित है जो उत्तर पत्रक पर अंकित है । इसमें कोई भिन्नता हो तो परीक्षार्थी वीक्षक से दूसरा प्रश्न-पत्र प्राप्त कर लें । ऐसा सुनिश्चित करने की जिम्मेदारी अभ्यर्थी की होगी ।
On opening the paper seal/polythene bag of the Question Paper Booklet the candidate should ensure that Question Paper Booklet No. of the Question Paper Booklet and Answer Sheet must be same. If there is any difference, candidate must obtain another Question Paper Booklet from Invigilator. Candidate himself shall be responsible for ensuring this.

परीक्षार्थियों के लिए निर्देश	INSTRUCTIONS FOR CANDIDATES

परीक्षार्थियों के लिए 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 है । 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. OMR उत्तर-पत्रक इस परीक्षा पुस्तिका के अन्दर रखा है । जब आपको परीक्षा पुस्तिका खोलने को कहा जाए, तो उत्तर-पत्रक निकाल कर ध्यान से केवल **नीले बॉल प्वाइंट पेन** से विवरण भरें ।
7. 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 ।
8. मोबाइल फोन अथवा इलेक्ट्रॉनिक यंत्र का परीक्षा हॉल में प्रयोग पूर्णतया वर्जित है । 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 सावधानीपूर्वक सही भरें । गलत अथवा अपूर्ण रोल नम्बर भरने पर **5 अंक** कुल प्राप्तांकों में से काटे जा सकते हैं ।

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 कराते हुए विविध नियमों-प्रावधानों के तहत कार्यवाही की जाएगी । साथ ही विभाग ऐसे अभ्यर्थी को भविष्य में होने वाली विभाग की समस्त परीक्षाओं से विवर्जित कर सकता है ।

INSTRUCTIONS FOR CANDIDATES

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. The **OMR** Answer Sheet is inside this Test Booklet. When you are directed to open the Test Booklet, take out the Answer Sheet and fill in the particulars carefully with **blue ball point pen** only.
7. **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.
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** can be deducted for filling wrong or incomplete Roll Number.

Warning : If a candidate is found copying or if any unauthorized 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. Department may also debar him/her permanently from all future examinations.

इस परीक्षा पुस्तिका को तब तक न खोलें जब तक कहा न जाए ।
Do not open this Test Booklet until you are asked to do so.

08-□

1. In an analog data acquisition unit, what is correct sequence of the blocks starting from the input ?

   (1) Transducer – Recorder – Signal conditioner

   (2) Transducer – Signal conditioner – Recorder

   (3) Signal conditioner – Transducer – Recorder

   (4) Signal conditioner – Recorder – Transducer

2. A 12 bit A/D converter has a range 0 – 10 V. What is the approximate resolution of the converter ?

   (1) 1 mV

   (2) 2.4 mV

   (3) 2.4 µV

   (4) 24 mV

3. In modern electric multi-meter, an FET or MOSFET is preferred over BJT because

   (1) Its input resistance is low.

   (2) Its input resistance is high.

   (3) Its input resistance is high and does not vary with the change of range.

   (4) It is cheaper.

4. In microwave telemetry, repeater stations are required at every

   (1) 2 km

   (2) 5 km

   (3) 40 km

   (4) 100 km

5. A clipper

   (1) removes part of the input signal

   (2) increases DC value of the input signal

   (3) reduces DC value of the input signal

   (4) modifies shape of the input signal

6. A Zener diode is used in regulator because

   (1) It is operated in breakdown region

   (2) It has efficiency for heavy load currents

   (3) It is always connected in parallel with load

   (4) Voltage across it remains constant for large changes of current through it.

7. What is the series resistance required to extend the 0 – 100 V range of a 20000 Ω/V meter to 0 – 1000 V ?

   (1) 10 MΩ

   (2) 16 MΩ

   (3) 18 MΩ

   (4) 20 MΩ

8. As the temperature is increased, the voltage across a diode carrying a constant current

(1) increases

(2) decreases

(3) remains constant

(4) may increase or decrease depending upon doping levels in the junction

9. A triangular wave can be generated by

(1) integrating a square wave

(2) differentiating a square wave

(3) integrating a sine wave

(4) differentiating a sine wave

10. In a common-emitter amplifier, the unbypassed emitter resistance provides
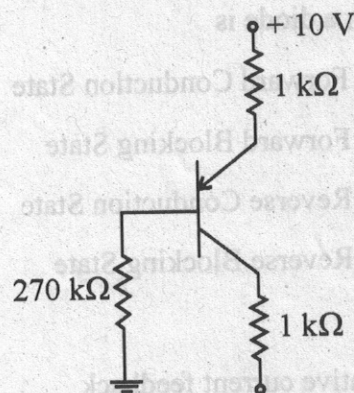
(1) Voltage shunt feedback

(2) Current series feedback

(3) Negative voltage feedback

(4) Positive current feedback

11. The circuit shown below is :
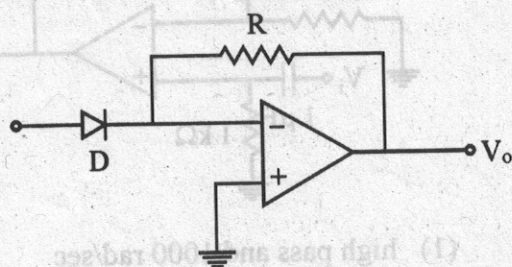
(1) Clamper

(2) Clipper

(3) Log amplifier

(4) Anti-log amplifier

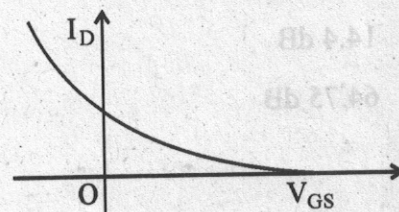**12.** The common-emitter forward current gain of the transistor shown in $\beta_F = 100$

The transistor is operating in

(1) saturation region

(2) cut off region

(3) reverse active region

(4) forward active region

13. The variation of drain current with gate to source voltage $(I_D - V_{GS})$ characteristic of a MOSFET is shown in figure given below. The MOSFET is

(1) an n-channel depletion mode device

(2) an n-channel enhancement mode device

(3) a p-channel depletion mode device

(4) a p-channel enhancement mode device

14. The operation state that distinguishes a Silicon Controlled Rectifier (SCR) from a diode is

    (1) Forward Conduction State

    (2) Forward Blocking State

    (3) Reverse Conduction State

    (4) Reverse Blocking State

15. Negative current feedback

    (1) decreases input impedance

    (2) increases output impedance

    (3) increases bandwidth

    (4) All of these
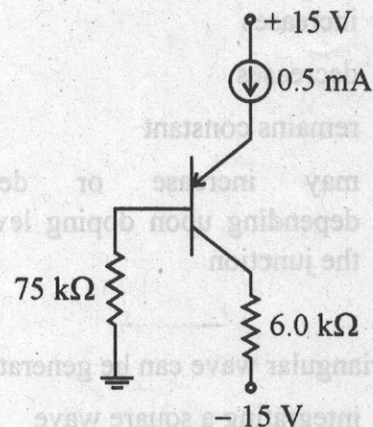
16. Each state of a three stage amplifier has a voltage gain of 12. The overall voltage gain of the amplifier is

    (1) 36 dB

    (2) 1728 dB

    (3) 14.4 dB

    (4) 64.75 dB

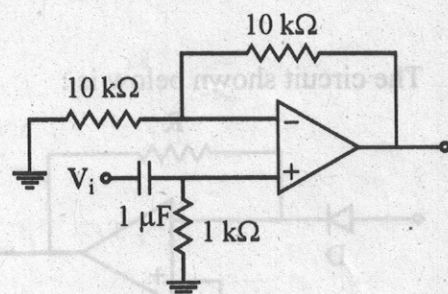17. If in a transistor, $\alpha = 0.98$, $I_{CO} = 6 \ \mu A$ and $I_B = 100 \ \mu A$, then the value of I_C will be

    (1) 4.6 mA

    (2) 2.3 mA

    (3) 3.1 mA

    (4) 5.2 mA

18. For the transistor shown below, $\beta = 100$. The value of voltage V_{EC} is

    (1) 3.13 V

    (2) 4.24 V

    (3) 5.18 V

    (4) 13.1 V

19. The op-amp circuit shown below is a filter. The type of filter and its cut off frequency are respectively

    (1) high pass and 1000 rad/sec

    (2) low pass and 1000 rad/sec

    (3) low pass and 10000 rad/sec

    (4) high pass and 10000 rad/sec

20. Bridge rectifier are preferred because

(1) They require small transformer

(2) They have less peak inverse voltage

(3) They need small transformer and also have less peak inverse voltage

(4) They have low ripple factor

21. In a forward biased photo diode, an increase in incident light intensity causes the diode current to

(1) increase

(2) remain constant

(3) decrease

(4) remain constant while the voltage drop across diode increases

22.
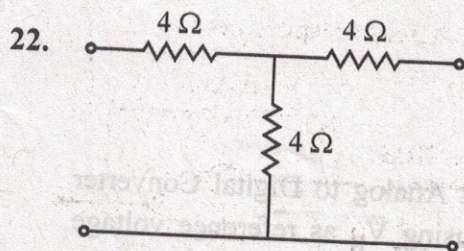
For the circuit shown above, h_{11}, h_{12}, h_{21} and h_{22} are respectively

(1) −0.5, 0.5, 0.125 and 6

(2) 6, 0.5, −0.5 and 0.125

(3) 0.5, −0.5, 6 and 0.125

(4) 0.125, 6, 0.5 and −0.5

23. The shunt type of regulator is suitable for which of the following ?

(1) Low current, high voltage

(2) Low current, low voltage

(3) High current, low voltage

(4) High current, high voltage

24. If an input periodic signal with non-zero d.c. component is impressed upon a high pass RC circuit, what will be the d.c. component in the output waveform ?

(1) Zero

(2) It depends upon the value of the capacitor.

(3) It depends upon value of the resistor.

(4) Same as that in input.

25. An amplifier having an output resistance of 4Ω gives an open circuit output voltage of 6V (rms). The maximum power that it can deliver to a load is

(1) 1.5 W

(2) 2.25 W

(3) 2.4 W

(4) 9 W

26. Given $(125)_R = (203)_5$. The value of radix R will be

(1) 16

(2) 10

(3) 8

(4) 6

27. An n bit parallel adder consist of

(1) $\frac{n}{2}$ full adder

(2) 2n half adder

(3) n full adder

(4) (n + 1) full adder

28. If the number of bits in input and output codes is 4 and 8 respectively for a ROM. The memory of this chip equals to

(1) 12 bit

(2) 32 bit

(3) 128 bit

(4) 256 bit

29. In a centre tap full wave rectifier, 100 V is the peak voltage between the centre tap and one end of the secondary. What is the maximum voltage across the reverse biased diode ?

(1) 200 V

(2) 141 V

(3) 100 V

(4) 86 V

30. Number of comparator required to build a 5 bit analog to digital type of converter is

(1) 5

(2) 11

(3) 31

(4) 21

31. In an 8 bit A/D converter, the quantization error is given by (in percent)

(1) 0.392

(2) 0.521

(3) 0.212

(4) 0.425

32. The resolution of an 8 bit optical encoder is

(1) $0.7°$

(2) $1.4°$

(3) $2.8°$

(4) $3.6°$

33. An n bit Analog to Digital Converter (ADC) using V_R as reference voltage has resolution (in volt) of

(1) $\dfrac{V_R}{2^n - 1}$

(2) $V_R n$

(3) $\dfrac{V_R}{2^{n-1}}$

(4) $2n \times V_R$

34. The D flip-flop can be made from a J-K flip-flop by making

(1) $J = K$

(2) $J = K = 1$

(3) $J = 0, K = 1$

(4) $J = \overline{K}$

35. The decimal equivalent of hexadecimal number of 2A0F is

(1) 17670

(2) 17667

(3) 17067

(4) 10767

36. The original spectrum of a message contains 100 Hz, 200 Hz frequency components. It is amplitude modulated by a carrier of 0.9 kHz. Which frequency components are contained in the amplitude modulated signal spectrum ?

(1) 900, 1000 and 1100 Hz

(2) 700, 800 and 900 Hz

(3) 700, 800, 900, 1000 and 1100 Hz

(4) 100, 200 and 900 Hz

37. A 5 bit DAC produces $V_{out} = 0.2$ V for a digital input of 00001. Find the value of V_{out} for a input of 11110.

(1) 3 V

(2) 12 V

(3) 6 V

(4) 9 V

38. If the ASCII character H is sent and the character I is received, what type of error is represented ?

(1) Single bit

(2) Multiple bit

(3) Burst

(4) Recoverable

39. For an amplitude modulated signal, the bandwidth is 10 kHz and the highest frequency component present is 705 kHz. The carrier frequency used for this AM signal is

(1) 695 kHz

(2) 700 kHz

(3) 705 kHz

(4) 710 kHz

40. Early effect in Bipolar Junction Transistor (BJT) refers to

(1) Avalanche breakdown

(2) Thermal runaway

(3) Base narrowing

(4) Zener breakdown

41. Which of the following is the correct statement ?

If the channel bandwidth doubles, the S/N ratio becomes

(1) Double of the former S/N ratio

(2) Squareroot of the former S/N ratio

(3) Half of the former S/N ratio

(4) None of these

42. A combinational circuit consist of

    (1) Logic gates only

    (2) Memory elements only

    (3) Logic Gates and a memory element

    (4) None of these

43. The operation of logical gate which is commutative but not associative is

    (1) NOR

    (2) EX-OR

    (3) OR

    (4) AND

44. A power MOSFET has three terminals called

    (1) collector, emitter and base

    (2) drain, source and base

    (3) drain, source and gate

    (4) collector, emitter and gate

45. Reverse recovery current in a diode depends upon

    (1) Forward field current

    (2) Storage charge

    (3) Temperature

    (4) PIV (Peak Inverse Voltage)

46. Express 8^4 in octal system.

    (1) $(1000)_8$

    (2) $(10000)_8$

    (3) $(10100)_8$

    (4) $(101000)_8$

47. The concept of V/f control of inverters driving induction motors result in

    (1) constant torque operation

    (2) speed reversal

    (3) reduced magnetic loss

    (4) harmonic elimination

48. In a thyristor DC chopper, which type of commutation results in best performance ?

    (1) Voltage commutation

    (2) Current commutation

    (3) Load commutation

    (4) Supply commutation

49. In a thyristor, anode current is made up of

    (1) electrons only

    (2) electrons or holes

    (3) electrons and holes

    (4) holes only

50. The number of p-n junctions in a thyristor is

    (1) 1

    (2) 2

    (3) 3

    (4) 4

51. Once SCR starts conducting a forward current, its gate loses control over

(1) anode circuit voltage only

(2) anode circuit current only

(3) anode circuit voltage and current

(4) anode circuit voltage, current and time

52. A dc separately excited motor has constant field current. The armature is fed from a single phase supply through a full converter. When $\alpha = 0$, speed is 500 rpm. If $\alpha = 45°$, the speed is likely to be :

(1) about 175 rpm

(2) about 350 rpm

(3) about 250 rpm

(4) about 125 rpm

53. The forward voltage drop during SCR on state is 1.5 V. This voltage drop

(1) remains constant and is independent of load current

(2) increases slightly with load current

(3) decreases slightly with load current

(4) varies linearly with load current

54. In an Unijunction Transistor (UJT), negative resistance region occurs

(1) before the peak point

(2) between peak and valley point

(3) after the valley point

(4) Both (1) and (3)

55. For a pulse transformer, the material used for its core and the possible turn ratio from primary to secondary are respectively

(1) Ferrite; 20 : 1

(2) Laminated iron; 1 : 1

(3) Ferrite; 1 : 1

(4) Powdered Iron; 1 : 1

56. A four quadrant chopper cannot be operated as

(1) one quadrant chopper

(2) cycloconverter

(3) inverter

(4) bi-directional rectifier

57. The function of Snubber circuit connected across an SCR is to

(1) suppress dv/dt

(2) increase dv/dt

(3) decrease dv/dt

(4) keep transient overvoltage at a constant value

58. A thyristor controlled reactor is used to get

(1) variable resistance

(2) variable capacitance

(3) variable inductance

(4) improved reactor power factor

59. How many switches are used to construct a three phase cycloconverter ?

(1) 3

(2) 6

(3) 12

(4) 18

60. When fed from a fully controlled rectifier a d.c. motor, driving an active load can operate in

(1) forward motoring and reverse braking mode

(2) forward motoring and forward braking mode

(3) reverse motoring and reverse braking mode

(4) reverse motoring and forward braking mode

61. The most suitable solid state converter for controlling the speed of the three phase cage motor at 25 Hz is

(1) Cycloconverter

(2) Current source inverter

(3) Voltage source inverter

(4) Load commutated inverter

62. A converter which can operate both in 3-phase and 6 pulse mode is a

(1) 1-phase full converter

(2) 3-phase half wave converter

(3) 3-phase semi converter

(4) 3-phase full converter

63. A motor armature supplied through phase controlled SCRs receives a smoother voltage shape at

(1) High motor speed

(2) Low motor speed

(3) Rated motor speed

(4) None of these

64. Which one of the following is the main advantages of Switch Mode Power Supply (SMPS) over linear power supply ?

(1) No transformer is required.

(2) Only one stage of conversion

(3) No filter is required.

(4) Low power dissipation

65. In the buck-boost converter, what is the maximum value of the switch utilisation factor ?

(1) 1.0

(2) 0.75

(3) 0.50

(4) 0.25

66. In a single phase full converter, the number of SCRs conducting during overlap is

    (1) 1

    (2) 2

    (3) 3

    (4) 4

67. A single phase full bridge inverter can operate in load communication mod in case load consist of

    (1) RL

    (2) RLC underdamped

    (3) RLC overdamped

    (4) RLC critically damped

68. A two quadrant d.c. to d.c. chopper can operate with which of the following load conditions ?

    (a) +ve voltage, +ve current

    (b) –ve voltage, +ve current

    (c) –ve voltage, –ve current

    (d) +ve voltage, –ve current

    Select the correct answer using the code given below :

    (1) (a) only

    (2) (a) and (b)

    (3) (a) and (d)

    (4) (c) and (d)

69. A single phase full bridge voltage source inverter has inductor L as the load. For a constant source voltage, the current through inductor is

    (1) Square wave

    (2) Triangular wave

    (3) Sine wave

    (4) Pulsed wave

70. When the firing angle α of a single phase fully controlled rectifier feeding constant d.c. current into the load is 30°, what is the displacement factor of the rectifier ?

    (1) 1

    (2) 0.5

    (3) $\sqrt{3}$

    (4) $\dfrac{\sqrt{3}}{2}$

71. In a current source inverter, if frequency of output voltage is f Hz, then frequency of voltage input to current source inverter is

    (1) f

    (2) 2f

    (3) $\dfrac{f}{2}$

    (4) 3f

11

72. Which one of the following statement is correct ?

In a thyristor, the holding current I_H is

(1) more than the latching current I_L

(2) less than I_L

(3) equal to I_L

(4) equal to zero

73. Which of the following power device is suitable for high frequency (7100 kHz) switching applications ?

(1) Power MOSFET

(2) Bipolar Junction Transistor

(3) Schotty Diode

(4) Microwave Transistor

74. A flowchart that outline the main segment of a program :

(1) Queue

(2) Macro

(3) Micro

(4) Union

75. A single phase inverter has square wave output voltage. What is the % of the fifth harmonic component in relation to the fundamental components ?

(1) 20%

(2) 30%

(3) 40%

(4) 10%

76. The programm counter in an 8085 microprocessor is a 16 bit register because

(1) It counts 16 bit at a time.

(2) There are 16 address lines.

(3) It facilitates the user storing 16 bit data temporarily.

(4) It has to fetch two 8 bit data at a time.

77. A microprocessor is Arithmetic logic unit

(1) and control unit on a single chip.

(2) and memory on a single chip.

(3) register unit and I/O device on a single chip.

(4) register unit and control unit on a single chip.

78. Which interrupt has the highest priority ?

(1) RST 7.5

(2) RST 7

(3) RST 6.5

(4) INTR

79. The number of output pins of an 8085 microprocessors are

(1) 40

(2) 27

(3) 21

(4) 19

80. The contents of the accumulator in an 8085 microprocessor is altered after the execution of the instruction :

    (1) CMPC

    (2) CPI 3A

    (3) ANI 5C

    (4) ORA A

81. In a microprocessor, the address of the next instruction to be executed, is stored in

    (1) Stack pointer

    (2) Address latch

    (3) Programme counter

    (4) General purpose register

82. In 8085, if the clock frequency is 5 MHz, the time required to execute an instruction of 18 T-states is (μs)

    (1) 3.0

    (2) 3.6

    (3) 4.0

    (4) 6.0

83. NOP instruction is used to

    (1) replace the existing instruction

    (2) insert the delay

    (3) debug the program

    (4) All of these

84. The contents of the Accumulator after the execution of the following programme will be

    MVI   A   C5H

    ORA   A

    RAL

    (1) 45 H

    (2) C5H

    (3) C4H

    (4) None of these

85. Which of the following 8085 assembly language instructions does not affect the contents of the accumulator ?

    (1) CMA

    (2) CMPB

    (3) DAA

    (4) ADDB

86. What is the number of machine cycles in the instruction LDA 2000 H that consist of thirteen states ?

    (1) 2

    (2) 3

    (3) 4

    (4) 5

87. The computer programme which converts statements written in high language to object code is known as

    (1) Assembler

    (2) Operating system

    (3) Object oriented software

    (4) None of these

88. Which of the following is not correct ?

(1) Bus is a group of wires.

(2) Bootstrap is a technique or device for loading first instruction.

(3) An instruction is a set of bits that defines a computer operation.

(4) An interrupt signal is required at the start of every program.

89. _____ keys are present on the top row of the keyboard.

(1) Function

(2) Type writer

(3) Numeric

(4) Navigation

90. The device primarily used to provide hardcopy is

(1) CRT

(2) Computer Console

(3) Printer

(4) Card reader

91. Both ALU and control section of CPU employ which special purpose storage locations ?

(1) Buffers

(2) Decoders

(3) Accumulators

(4) Registers

92. These devices provide a means of communication between a computer and outer world :

(1) I/O

(2) Storage

(3) Compact

(4) Drivers

93. A plug and play storage device that simply plugs in the port of a computer is

(1) Flash Drive

(2) Compact Disk

(3) Hard Disk

(4) Floppy Drive

94. A second order control system is defined by the following differential equation :

$$\frac{4d^2c(t)}{dt^2} + \frac{8dc(t)}{dt} + 16c(t) = 164(t)$$

The damping ratio and natural frequency for this system are respectively.

(1) 0.25 and 2 rad/sec

(2) 0.50 and 2 rad/sec

(3) 0.25 and 4 rad/sec

(4) 0.50 and 4 rad/sec

95. Which among the device that converts output into a form that can be transmitted over a telephone line ?

(1) Teleport

(2) Multiplexer

(3) Concentrator

(4) Modem

96. If a ramp input is applied to type 2 system, the steady state error is

(1) positive constant

(2) negative constant

(3) zero

(4) positive infinity

97. Indicate which one of the following transfer functions represent phase lead compensator.

(1) $\dfrac{s+1}{s+2}$

(2) $\dfrac{6s+3}{6s+2}$

(3) $\dfrac{s+5}{3s+2}$

(4) $\dfrac{s+8}{s^2+5s+6}$

98. A linear time invariant system, initially at rest when subjected to a unit step gave response $c(t) = te^{-t}$ $(t \geq 0)$. The transfer function of the system is

(1) $\dfrac{s}{(s+1)^2}$

(2) $\dfrac{1}{s(s+1)^2}$

(3) $\dfrac{1}{(s+1)^2}$

(4) $\dfrac{1}{s(s+1)}$

99. Consider the following equation :

$$2s^4 + s^3 + 3s^2 + 5s + 10 = 0$$

How many roots does this equation have in the right half of s-plane ?

(1) One

(2) Two

(3) Three

(4) Four

100. Consider the network function :

$$G(s) = \dfrac{2(s+3)}{(s+2)(s+4)}$$

What is the steady state response due to a unit step input ?

(1) $\dfrac{4}{3}$

(2) $\dfrac{1}{2}$

(3) $\dfrac{3}{4}$

(4) 1

101. A second order control system has

$$M(j\omega) = \dfrac{100}{100 - \omega^2 + 10\sqrt{2}\,j\omega}$$

Its Mp (peak magnitude) is approximately

(1) 0.5

(2) 1

(3) $\sqrt{2}$

(4) 2

15

08

102. What is the range of k for which the open loop transfer function ?

$$G(s) = \frac{k}{s^2(s+a)}$$ represents an

unstable closed loop system ?

(1) $k > 0$

(2) $k = 0$

(3) $k < 0$

(4) $-\infty < k < \infty$

103. A second order control system has a transfer function

$$\frac{C(s)}{R(s)} = \frac{W_n^2}{s^2 + 28 W_n s + W_n^2}$$

The peak overshoot is given as

(1) $e^{\frac{-\pi\delta}{\sqrt{1-\delta^2}}}$

(2) $\dfrac{\pi}{W_n \sqrt{1-\delta^2}}$

(3) $\dfrac{4}{\delta W_n}$

(4) $\dfrac{\pi - \tan^{-1}\sqrt{\dfrac{1-\delta^2}{\rho}}}{W_n \sqrt{1-\rho^2}}$

104. To detect position error in a position control system, which of the following can be used ?

(a) Potentiometers

(b) Synchros

(c) LVDT

Select the correct answer using the code given below :

(1) (a) and (b)

(2) (a) and (c)

(3) (b) and (c)

(4) (a), (b) and (c)

105. What does the function f(t) plotted in the below figure represent ?
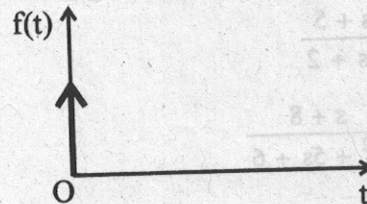
(1) unit step function

(2) unit impulse function

(3) unit ramp function

(4) unit parabolic function

106. The low and high frequency asymptotes of Bade magnitude plot are respectively −60 dB/decade and −40 dB/decade. What is the type of system ?

(1) Type-0

(2) Type-I

(3) Type-II

(4) Type-III

107. Encirclement of origin of $1 + G(s)$ plane corresponds to encirclement of a point in the $-1 + G(s)$ plane, given by

(1) $1 + j0$

(2) $0 + j0$

(3) $-2 + j0$

(4) $-1 + j0$

108. The transfer function of the system described by
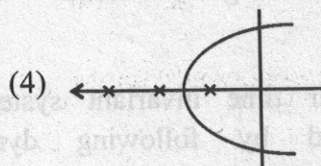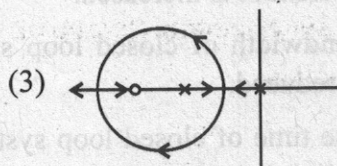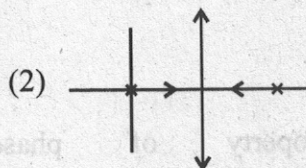
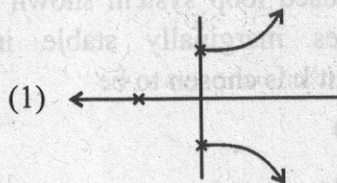$$\frac{d^2y}{dt^2} + \frac{dy}{dt} = \frac{du}{dt} + 2U$$

with u as input an y as output is

(1) $\dfrac{s+2}{s^2+s}$

(2) $\dfrac{s+1}{s^2+s}$

(3) $\dfrac{2}{s^2+s}$

(4) $\dfrac{2s}{s^2+s}$

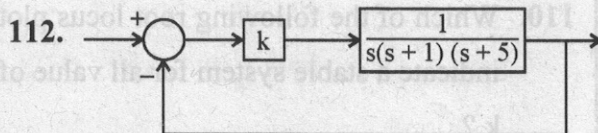109. What is the Laplace transform of a function $\delta(t - 2)$?

(1) 2

(2) 0

(3) e^{-2s}

(4) 2s

110. Which of the following root locus plot indicate a stable system for all value of k ?

(1)

(2)

(3)

(4)

111. Introduction of feedback affects the stability by

(1) increasing it

(2) decreasing it

(3) may increase or decrease depending on type of feedback

(4) No effect on stability.

112.

The closed loop system shown above becomes marginally stable in the constant k is chosen to be

(1) 10

(2) 20

(3) 30

(4) 40

113. A property of phase-lead compensation is that the

(1) overshoot is increased.

(2) bandwidth of closed loop system is reduced.

(3) rise time of closed loop system is reduced.

(4) chain margin is reduced.

114. A linear time invariant system is described by following dynamic equation

$$\frac{dx(t)}{dt} = Ax(t) + Bu(t)$$

$$y(t) = Cx(t)$$

where $A = \begin{bmatrix} 0 & 1 \\ -2 & -3 \end{bmatrix}$, $B = \begin{bmatrix} 0 \\ 1 \end{bmatrix}$,

$C = [1, 1]$

The system is

(1) both controllable and observable

(2) controllable but unobservable

(3) observable but uncontrollable

(4) both uncontrollable and unobservable

115. The state space representation of a system is given by

$$\dot{X} \begin{bmatrix} -1 & 0 \\ 0 & -2 \end{bmatrix} X + \begin{bmatrix} 1 \\ 0 \end{bmatrix} U \text{ and}$$

$$Y = \begin{bmatrix} 1 \\ 1 \end{bmatrix}^T X$$

Then the transfer function of the system is

(1) $\dfrac{1}{s^2 + 3s + 2}$

(2) $\dfrac{1}{s + 2}$

(3) $\dfrac{s}{s^2 + 3s + 2}$

(4) $\dfrac{1}{s+1}$

116. What are the order and type of closed loop system for the plant transfer function $G(s) = \dfrac{k}{s^2 (1 + sT)}$ and with unity feedback ?

(1) Two and two

(2) Three and two

(3) Two and zero

(4) Three and zero

117. Linearity of a system involves

(1) Principle of additivity only

(2) Principle of Homogeneity only

(3) Both additivity and homogeneity

(4) None of these

118. For the equation $s^3 - 4s^2 + s + 6 = 0$, the number of roots in the left half of s-plane will be

(1) Zero

(2) One

(3) Two

(4) Three

119. Consider the following statements :

The gain cross over point is the point where

(a) the magnitude $|G(j\omega)| = 1$ in polar plot.

(b) the magnitude curve of $G(j\omega)$ crosses zero dB line in Bode plot.

(c) magnitude V/s phase plot touches the zero dB loci in Nichol's chart.

Which of the following statements are correct ?

(1) Only (a) and (b)

(2) Only (a) and (c)

(3) Only (b) and (c)

(4) (a), (b) and (c)

120. Voltage transfer function of a simple RC integrator has

(1) a finite zero and a pole at infinity

(2) a finite zero and a pole at the origin

(3) a zero at the origin and a finite pole

(4) a zero at infinity and a finite pole

121. Consider the following techniques :

(a) Bode plot

(b) Nyquist plot

(c) Nichol's chart

(d) Routh-Hurwitz criterion

Which of the above techniques are used to determine relative stability of a closed loop linear system ?

(1) (a) and (b)

(2) (a) and (d)

(3) (a), (b) and (c)

(4) (b), (c) and (d)

122. A system is completely state controllable, if

(1) it is possible to transfer two system states.

(2) it is possible to transfer the system state from any initial state $x(t_0)$ to any other desired state $x(t)$ in specified finite time by a control vector u(t).

(3) every state $x(t)$ can be completely identified by measurements of the output $\theta(t)$ over a finite time interval

(4) None of these

123. In a moving iron meter, the deflection torque is proportional to

(1) square of the current through the coil

(2) current through the coil

(3) sine of measurand

(4) squareroot of the measurand

124. A current transformer has a rating of 100/5A. Its magnetizing and loss components of the exciting current are 1 A and 0.6 A respectively and secondary winding burden is purely resistive. Its transformation ratio at rated current is :

(1) 20.12

(2) 20.2

(3) 200.2

(4) None of these

125. A zero to 300 V voltmeter has guaranteed accuracy of 2% full scale reading. The voltage measured by instrument is 60 V. The percentage limiting error is

(1) 5

(2) 10

(3) 6

(4) 12

126. Measuring instruments can be classified into two broad categories :

(1) absolute instruments and primary instruments

(2) absolute instruments and secondary instruments

(3) indicating instruments and integrating instruments

(4) active instruments and passive instruments

127. Flow meters which are particularly suitable for the flow measurements of slurries, sludge and any electrical conducting medium :

(1) electro-magnetic flow meter

(2) Turbine meter

(3) Hot wire anemometer

(4) Ratometer

128. In using instrument transformers, care should be taken not to open circuit the

(1) Primary of a voltage transformer when the secondary is connected to the rated load

(2) Secondary of a voltage transformer when the primary is energized with the rated voltage

(3) Secondary of a current transformer when the primary is carrying the rated current

(4) Primary of a current transformer when the secondary is connected to the rated load

129. Which of the following materials is used in the fabrication of swamping resistance of a PMMC instrument ?

(1) Copper

(2) Aluminium

(3) Manganin

(4) Tungsten

130. The power of a three phase, three wire balanced system was measured by two wattmeter method. The reading of one of the wattmeters was found to be double that of the other. What is the power factor of the system ?

(1) 1

(2) 0.866

(3) 0.707

(4) 0.5

131. Low resistance is measured by

(1) De-Sauty's bridge

(2) Maxwell's bridge

(3) Kelvin's double bridge

(4) Wein's bridge

132. Observational errors are called :

(1) gross errors

(2) systematic errors

(3) random errors

(4) instrumental errors

133. The standardization of AC potentiometer is done by

(1) using DC standard source and d' Arsonval galvanometer

(2) using AC standard sources and transfer instruments

(3) directly using AC standard voltage sources

(4) using DC standard sources and transfer instrument

134. In Wien's bridge, the output frequency is determined by

(1) RLC combination

(2) LC combination

(3) RC combination

(4) RL combination

135. Creeping in energy meter implies

(1) Slow rotation of rotor with only voltage coil excited

(2) Slow rotation of rotor with current coil excited

(3) Fast rotation of rotor with current coil excited

(4) None of these

136. The reading of polar type potentiometer are

$$V = 30.5 \underline{|35.6°}$$

$$I = 11.3 \underline{|24.7°}$$

Then, reactance of the coil will be

(1) 2.64 Ω

(2) 2.69 Ω

(3) 0.51 Ω

(4) 0.64 Ω

137. The scale of voltmeter is uniform. Its type is

(1) Moving Iron

(2) Induction

(3) Moving coil permanent magnet

(4) Moving coil dynamometer

138. The circuit in figure is used to measure the power consumed by the load. The current coil and the voltage coil of the wattmeter have $0.02\ \Omega$ and $1000\ \Omega$ resistance respectively. The measured power compared to the load power will be
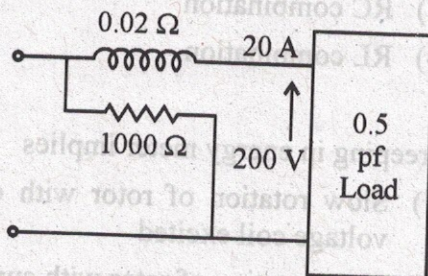
(1) 0.4% less

(2) 0.2% less

(3) 0.2% more

(4) 0.4% more

139. In single phase induction meter, in order to obtain true value of energy, the shunt magnetic flux should lag behind the applied voltage by

(1) 90°

(2) 0°

(3) 45°

(4) None of these

140. X and Y plates of a CRO are connected to unequal voltages of equal frequency with phase shift of 90°. The Lissajous on the screen will be

(1) circle

(2) straight line

(3) ellipse

(4) figure of eight

141. Pair of active transducers is

(1) Thermistor, Solar cell

(2) Thermocouple, Thermistor

(3) Thermocouple, Solar cell

(4) Solar cell, LVDT

142. Pulse code modulation is commonly used in telemetry because

(1) It ensures immunity from noise during transmission

(2) The bandwidth requirement of the channel is reduced

(3) It removes quantization error

(4) It permits lower rate of sampling than what is normally required under Shanon's theorem.

143. A Digital voltmeter measures

(1) peak value

(2) peak to peak value

(3) rms value

(4) average value

144. A waveform shown in figure, is fed to an a.c. ammeter. What is the reading shown by the meter ?

Time Period
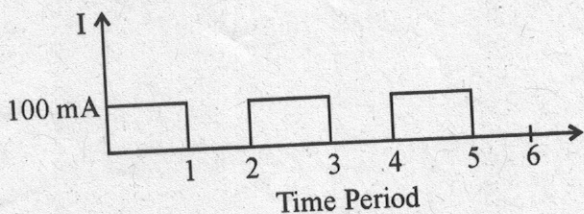
(1) Zero

(2) 50 mA

(3) 70.72 mA

(4) 57.73 mA

145. Which displacement transducer is used for accurate and linear measurement ?

(1) LVDT

(2) Strain Gauge

(3) Potentiometer

(4) Capacitive displacement transducer

146. Which one of the following transducers can be used for measurement of pressure as high as 1,00,000 atmosphere ?

(1) McLeod gauge

(2) Pirani gauge

(3) Bridgman gauge

(4) Knudsen gauge

147. Beam of electrons in a cathode ray tube emanates because of

(1) Thermionic emission

(2) Second emission

(3) Diffusion

(4) Post acceleration

148. The total current $I = I_1 + I_2$ in a circuit is measured as $I_1 = 150 \pm 1A$, $I_2 = 250 \pm 2A$, where the limits of error are given as standard deviations. I is measures as

(1) 400 ± 3 A

(2) 400 ± 2.24 A

(3) 400 ± 3.25 A

(4) 400 ± 1.25 A

149. A single channel digital storage oscilloscope uses a 12 bit, 10^8 samples/sec ADC. For a 10 kHz sine wave input, what is the number of samples taken per cycle of input ?

(1) 10^{12}

(2) 10^8

(3) 10^4

(4) 10^2

150. The circuit generally used in digital instruments to convert sine waves into rectangular pulses is a

(1) Sawtooth generator

(2) Differential Amplifier

(3) Sample and Hold circuit

(4) Schmitt Trigger

रफ कार्य के लिए स्थान / SPACE FOR ROUGH WORK