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प्रश्नपुस्तिका क्रमांक
Question Booklet No.

प्रश्नपुस्तिका सीरीज
Question Booklet Series
A

M.Sc (Electronics) First Semester, Examination, February/March-2022

ELC-104(N)

Semiconductor Devices

Time : 1:30 Hours **Maximum Marks-100**

जब तक कहा न जाय, इस प्रश्नपुस्तिका को न खोलें

निर्देश : –

1. परीक्षार्थी अपने अनुक्रमांक, विषय एवं प्रश्नपुस्तिका की सीरीज का विवरण यथास्थान सही– सही भरें, अन्यथा मूल्यांकन में किसी भी प्रकार की विसंगति की दशा में उसकी जिम्मेदारी स्वयं परीक्षार्थी की होगी।
2. **इस प्रश्नपुस्तिका में 100 प्रश्न हैं, जिनमे से केवल 75 प्रश्नों के उत्तर परीक्षार्थियों द्वारा दिये जाने है। प्रत्येक प्रश्न के चार वैकल्पिक उत्तर प्रश्न के नीचे दिये गये हैं। इन चारों में से केवल एक ही उत्तर सही है। जिस उत्तर को आप सही या सबसे उचित समझते हैं, अपने उत्तर पत्रक (O.M.R. ANSWER SHEET)में उसके अक्षर वाले वृत्त को काले या नीले बाल प्वांइट पेन से पूरा भर दें। यदि किसी परीक्षार्थी द्वारा निर्धारित प्रश्नों से अधिक प्रश्नों के उत्तर दिये जाते हैं तो उसके द्वारा हल किये गये प्रथमतः यथा निर्दिष्ट प्रश्नोत्तरों का ही मूल्यांकन किया जायेगा।**
3. प्रत्येक प्रश्न के अंक समान हैं। आप के जितने उत्तर सही होंगे, उन्हीं के अनुसार अंक प्रदान किये जायेंगे।
4. सभी उत्तर केवल ओ०एम०आर० उत्तर पत्रक **(O.M.R. ANSWER SHEET)** पर ही दिये जाने हैं। उत्तर पत्रक में निर्धारित स्थान के अलावा अन्यत्र कहीं पर दिया गया उत्तर मान्य नहीं होगा।
5. ओ०एम०आर० उत्तर पत्रक **(O.M.R. ANSWER SHEET)** पर कुछ भी लिखने से पूर्व उसमें दिये गये सभी अनुदेशों को सावधानीपूर्वक पढ़ लिया जाय।
6. परीक्षा समाप्ति के उपरान्त परीक्षार्थी कक्ष निरीक्षक को अपनी प्रश्नपुस्तिका बुकलेट एवं ओ०एम०आर० शीट पृथक–पृथक उपलब्ध कराने के बाद ही परीक्षा कक्ष से प्रस्थान करें।
7. निगेटिव मार्किंग नहीं है।

506

महत्वपूर्ण : – **प्रश्नपुस्तिका खोलने पर प्रथमतः जॉच कर देख लें कि प्रश्नपुस्तिका के सभी पृष्ठ भलीभॉति छपे हुए हैं। यदि प्रश्नपुस्तिका में कोई कमी हो, तो कक्ष निरीक्षक को दिखाकर उसी सीरीज की दूसरी प्रश्नपुस्तिका प्राप्त कर लें।**

1. A semiconductor is formed by ______ bonds.

   (A) Covalent

   (B) Electrovalent

   (C) Co-ordinate

   (D) None of above

2. A semiconductor has _____ temperature coefficient of resistance.

   (A) Positive

   (B) Negative

   (C) Zero

   (D) None of above

3. The most commonly used semiconductor is ______.

   (A) Germanium

   (B) Silicon

   (C) Carbon

   (D) Sulpher

4. When a pentavalent impurity is added to a pure semiconductor, it becomes ______.

   (A) An Insulator

   (B) An Intrinsic Semiconductor

   (C) A n-type Semiconductor

   (D) A p-type Intrinsic Semiconductor

5. In a semiconductor, current conduction is due to _______.

   (A) Holes

   (B) Free electrons

   (C) Holes and Free electrons

   (D) None of above

6. A pn junction acts as a _______.

(A) Controlled Switch

(B) Unidirectional Switch

(C) Bidirectional Switch

(D) None of above

7. The leakage current in a pn junction is of the order of ______.

(A) Kamp

(B) Amp

(C) Miliamp

(D) None of above

8. The current obtained from a filterless rectifier is_______.

(A) an eddy current

(B) sinusoidal current

(C) varying direct current

(D) constant direct current

9. A donor impurity _______.

(A) increases the resistance of the semiconductor

(B) produces energy bands above the valence bands

(C) produces n type semiconductors

(D) produces p type semiconductors

10. Fermi energy is the _______.

(A) minimum energy of electrons in a metal at 0 K

(B) maximum energy of electrons in a metal at 0 K

(C) minimum energy of electrons in a metal at 0^o C

(D) maximum energy of electrons in a metal at 0^o C

11. When a p-n junction diode is forward biased, the flow of current across the junction is mainly due to _______.

(A) drifting of charges

(B) diffusion of charges

(C) both drift and diffusion of charges

(D) minority charge carriers

12. In a half wave rectifier, the output frequency is 50 Hz if the input frequency is 50 Hz. What is the output frequency of a full wave rectifier for the same input frequency?

(A) 50 Hz

(B) 75 Hz

(C) 25 Hz

(D) 100 Hz

13. When the resistance between p and n regions is very high then the p-n junction diode acts as ________.

(A) an inductor

(B) a transistor

(C) a capacitor

(D) zener diode

14. Ques: If in a p-n junction diode, the drift current is less than the diffusion current in magnitude, then _______.

(A) p-n junction is forward biased

(B) p-n junction is reverse biased

(C) p-n junction is unbiased

(D) p and n regions are heavily doped

15. Zener breakdown Occurs only when _______.

(A) it is lightly doped

(B) the temperature is increased

(C) it is forward biased

(D) it is reverse biased

16. The colour of light emitted by a LED depends upon _______.

(A) its forward bias

(B) its reverse bias

(C) the amountof forward or reverse current

(D) the material of the semiconductor

17. In a BJT the base current (I_B) is about ______ of emitter current (IE).

(A) 5%

(B) 20%

(C) 25%

(D) 35%

18. Among these which one is correct about the characteristics of the transistor?

(A) It has very low input impedance

(B) It has zero input impedance

(C) It has the high input impedance

(D) It has low input impedance

19. Which configuration in Bipolar Junction Transistor is also known as Voltage follower circuit?

(A) Common Base

(B) Common Collector

(C) Common Emitter

(D) None of these

20. In a PN junction with no external voltage, the electric field between acceptor and donor ions is called a_______.

(A) Peak

(B) Barrier

(C) Threshold

(D) Path

21. The emitter of a transistor is ______ doped.

(A) Heavily

(B) Moderately

(C) Lightly

(D) None of above

22. The input impedance of a transistor is _______ as compared to MOSFET.

(A) Low

(B) High

(C) Very high

(D) None of above

23. In an NPN transistor, _______ are the minority carrier.

(A) Electron

(B) Holes

(C) Donor ions

(D) Acceptor ions

24. The value of alpha of a transistor is ______.

(A) 0

(B) 1

(C) More than 1

(D) Less than 1

25. Transistor biasing represents _______ condition.

(A) ac

(B) Both ac and dc

(C) dc

(D) None of the above

26. The point of intersection of DC and AC load lines represent _______.

(A) Operating point

(B) Current point

(C) Voltage gain

(D) None of the above

27. The phase difference between the input and output voltage in a common emitter arrangement is _______.

(A) 90

(B) 120

(C) 270

(D) 180

28. If the base resistor is very small, the transistor will operate in the _______.

(A) Cut off region

(B) Active region

(C) Saturation region

(D) All of the above

29. For operating in the active region, the emitter junction should be _______ biased and collector junction should be _______ biased in BJT.

(A) forward, forward

(B) reverse, reverse

(C) forward, reverse

(D) reverse, forward

30. The transistor acts as an amplifier in the _________region.

(A) Cut off

(B) Active

(C) Saturation

(D) None of the above

31. In a BJT as collector to base voltage increases the emitter current:

(A) Remains same

(B) Increases slightly

(C) Decreases slightly

(D) Depends upon doping of the emitter region

32. The BJT was invented by _______.

(A) W. H Brattin

(B) Bardeen

(C) William Shockley

(D) All of the above

33. In CB configuration, a transistor transfers _______.

(A) Voltage from high impedance circuit to low impedance

(B) Voltage from low impedance circuit to high impedance

(C) Current form high impedance circuit to low impedance circuit

(D) Current form low impedance circuit to high impedance circuit

34. _______ transistor is affected by static electricity:

(A) N-P-N transistor

(B) UJT

(C) FET

(D) MOSFET

35. Which of the following an advantage of an alloy transistor:

(A) Low saturation resistance

(B) Better Low frequency response

(C) High cut-off frequency

(D) High saturation resistance

36. The transistor is said to be in quiescent state when:

(A) No signal is applied to the input

(B) No currents are flowing

(C) It is unbiased

(D) Emitter junction and collector junction biases are equal

37. The transistor can transfer _______.

(A) A signal form low resistance to high resistance

(B) A weak signal of only higher frequencies through it

(C) A weak signal of only lower frequencies through it

(D) Signal from high resistance to low resistance

38. Transistor is a device which is a______.

(A) Transferring voltage device

(B) Current operated one

(C) Power operated one

(D) Voltage operated one

39. In MOSFETs N-channel is more preferred than P-channel because:

(A) It is cheaper

(B) It is faster

(C) It has better drive capability

(D) It has better noise immunity

40. The input gate current of a FET is ______.

(A) A few micro-amperes

(B) A few mili-amperes

(C) A few amperes

(D) Negligible

41. A JFET has three terminals, namely _______.

(A) cathode, anode, grid

(B) emitter, base, collector

(C) source, gate, drain

(D) None of the above

42. A JFET is similar in operation to ______Valve:

(A) Diode

(B) Pentode

(C) Triode

(D) Tetrode

43. A JFET is also called ______transistor:

(A) unipolar

(B) bipolar

(C) unijunction

(D) None of the above

44. The input impedance of a JFET is ______ that of an ordinary transistor:

(A) Equal to

(B) Less than

(C) More than

(D) None of the above

45. When drain voltage equals the pinch-off-voltage, then drain current ______with the increase in drain voltage:

(A) Decreases
(B) Increases
(C) Remains constant
(D) None of the above

46. If the reverse bias on the gate of a JFET is increased, then width of the conducting channel ________.

(A) is decreased
(B) is increased
(C) remains the same
(D) none of the above

47. A MOSFET can be operated with _______.

(A) Negative gate voltage only
(B) Positive gate voltage only
(C) Positive as well as negative gate voltage
(D) None of the above

48. The input control parameter of a JFET is _______.

(A) Gate voltage
(B) Source voltage
(C) Drain voltage
(D) Gate current

49. A common base configuration of a pnp transistor is analogous to _______of a JFET:

(A) Common source configuration
(B) Common drain configuration
(C) Common gate configuration
(D) None of the above

50. A JFET has high input impedance because _______.

(A) It is made of semiconductor material
(B) Input is reverse biased
(C) Of impurity atoms
(D) None of the above

51. In a JFET, when drain voltage is equal to pinch-off voltage, the depletion layers _______.

(A) almost touch each other

(B) have large gap

(C) have moderate gap

(D) None of the above

52. In a JFET, I_{DSS} is known as _______.

(A) Drain to source current

(B) Drain to source current with gate shorted

(C) Drain to source current with gate open

(D) None of the above

53. The two important advantages of a JFET are _______.

(A) High input impedance and square-law property

(B) Inexpensive and high output impedance

(C) Low input impedance and high output impedance

(D) None of the above

54. Which of the following devices has the highest input impedance?

(A) JFET

(B) MOSFET

(C) Crystal diode

(D) Ordinary transistor

55. The pinch-off voltage in a JFET is analogous to _______voltage in a vacuum tube:

(A) Anode

(B) Cathode

(C) Grid cut off

(D) None of the above

56. In class A operation, the input circuit of a JFET is _______biased:

(A) Forward

(B) Reverse

(C) Not

(D) None of the above

57. If the gate of a JFET is made less negative, the width of the conduction channel_______.

(A) Remains the same

(B) is decreased

(C) is increased

(D) None of the above

58. The gate voltage in a JFET at which drain current becomes zero is called _______voltage:

(A) Saturation

(B) pinch-off

(C) active

(D) cut-off

59. For $V_{GS} = 0$ V, the drain current becomes constant when V_{DS} exceeds:

(A) cut off

(B) V_{DD}

(C) V_P

(D) 0 V

60. A certain JFET data sheet gives $VGS_{(off)} = -4$ V. The pinch-off voltage V_p is _____.

(A) + 4 V

(B) - 4 V

(C) dependent on V_{GS}

(D) data insufficient

61. Gunn diode can be operated in ______.

(A) Three different modes

(B) Two different modes

(C) Four different modes

(D) No mode

62. Gallium Arsenide is preferred to Silicon in formation of Gunn diode______.

(A) Low noise at high frequency

(B) Better frequency stability

(C) High ion mobility

(D) Suitable energy band

63. Microwave Semiconductor devices are _______.

(A) Positive resistance

(B) Negative resistance

(C) Zero resistance

(D) High resistance

64. In microwave range most noisy semiconductor device is_______.

(A) IMPATT

(B) TRAPATT

(C) GUN

(D) TUNNEL DIODE

65. In Microwave we consider the elements as_______.

(A) Lumped circuit elements

(B) Distributed circuit elements

(C) Both are correct

(D) None of these

66. The major advantage of TWT over Klystron is _______.

(A) Higher gain

(B) Higher frequency

(C) Higher output

(D) Higher bandwidth

67. Travelling wave parametric amplifiers are used to _______.

(A) Provide a greater gain

(B) Reduce the number of varactor diodes required

(C) Avoid the need for cooling

(D) Provide a greater bandwidth

68. For best low-level noise performance in the X-band an amplifier should use:

(A) A bipolar transistor

(B) A Gunn diode

(C) A step recovery diode

(D) An IMPATT diode

69. For Gunn diodes, gallium arsenide is preferred to silicon because the former:

(A) Has a suitable empty energy band, which silicon does not have

(B) Has a higher ion mobility

(C) Has a lower noise at the highest frequencies

(D) Is capable of handling higher power densities

70. Microwave antenna aperture efficiency depends on:

(A) Feed Pattern

(B) Antenna Aperture

(C) Surface losses

(D) Low side lobe level

71. The negative resistance in a tunnel diode _______.

(A) is maximum at the peak point of the characteristic

(B) is available between the peak and valley points

(C) is maximum at valley point

(D) may be improved by the use of reverse bias

72. A varactor diode may not be useful at microwave frequencies ______.

(A) For electronic tuning

(B) For frequency multiplication

(C) As an oscillator

(D) As a parametric amplifier

73. The biggest advantage of the TRAPATT diode over the IMPATT diode is its_____.

(A) Low noise

(B) Higher efficiency

(C) Ability to operate at higher frequencies

(D) Lesser sensitivity to harmonics

74. In microwave power measurements using bolometer, the principle of working is the variation of_______.

(A) Inductance with absorption of power

(B) Resistance with absorption of power

(C) Capacitance with absorption of power

(D) Cavity dimensions with heat generated by the power

75. Which of the following can be used for amplification of microwave energy?

(A) Travelling wave tube

(B) Magnetron

(C) Reflex Klystron

(D) Gunn diode

76. A Magic-Tee is _______.

(A) A modification of E-plane tee

(B) A modification of H-plane tee

(C) A combination of E-Plane and H-Plane

(D) Two E-plane tees connected in parallel

77. Klystron operates on the principle of ______.

(A) Amplitude Modulation

(B) Frequency Modulation

(C) Pulse Modulation

(D) Velocity Modulation

78. The modes in a reflex Klystron______.

(A) give the same frequency but different transit times

(B) result from excessive transit time across the resonator gap

(C) are caused by spurious frequency modulation

(D) are just for theoretical consideration

79. Tunnel diode does not exhibit______.

(A) Positive resistance

(B) Negative resistance

(C) Both

(D) None of the above

80. Full form of SONAR is ______.

(A) sound navigate resonance

(B) sound near rectification

(C) Sound Navigation and ranging

(D) sound navigate resistance

81. A silicon controlled rectifier (SCR) is_______.

(A) Unijunction device

(B) Device with three junction

(C) Device with four junction

(D) None of the above

82. A thyristor is basically

(A) PNPN device

(B) A combination of Diac and Triac

(C) A set of SCRs

(D) A set of SCR, Diac and a Triac

83. Which semiconductor power device out of the following is not a current triggering device?

(A) Thyristor

(B) Triac

(C) G.T.O

(D) MOSFET

84. Which of the following device incorporates a terminal for synchronizing purposes?

(A) Diac

(B) Triac

(C) SUS

(D) None of the above

85. The advantages of SCS over SCR is_______.

(A) Show switching time and large V_H

(B) Slow switching time and smaller V_H

(C) Faster switching time and smaller V_H

(D) Faster switching time and large V_H

86. A thyristor equivalent of a thyratron tube is a ______.

(A) Diac

(B) Triac

(C) Silicon controlled rectifier

(D) None of the above

87. A device that cannot be triggered with low voltage of either polarity is ______.

(A) Diac

(B) Triac

(C) SCS

(D) None of the above

88. Which of the following finds applications in speed control of a DC motor?

(A) FET

(B) NPN transistor

(C) SCR

(D) None of the above

89. For the high-frequency choppers, the device that is preferred is______.

(A) TRIAC

(B) Thyristor

(C) Transistor

(D) GTO

90. In Ac voltage regulator, TRIACS cannot be used for a______.

(A) Back emf load

(B) Resistive load

(C) R-L Load

(D) Inductive load

91. Power electronics convert ______ energy into another form of energy.

(A) Electrical

(B) Mechanical

(C) Solar

(D) All of above

92. In a thyristor-

(A) The holding current is greater than latching current

(B) The two current are equal

(C) The latching current is greater the holding current

(D) None of the above

93. The VI characteristic of UJT is_______.

(A) Similar to CE with a linear and saturation region

(B) Similar to FET with a linear and pinch off region

(C) Similar to tunnel diode in some respects

(D) Similar to PN junction diode in some respects

94. Chopper control for DC motor provides variation in ______.

(A) Input voltage

(B) Frequency

(C) Current

(D) None of the above

95. In a thyristor the ratio of latching current to holding current is:

(A) 0.5

(B) 1

(C) 2.7

(D) 5

96. In a thyristor, dv/dt protection is achieved through the use of _______.

(A) L across thyristor
(B) RC across thyristor
(C) R across thyristor
(D) RL across thyristor

97. Inverter converts:

(A) DC to AC
(B) AC to DC
(C) DC to DC
(D) AC to AC

98. UJT when used for triggering an SCR, has the waveform:

(A) Sine wave
(B) Square Wave
(C) Sawtooth wave
(D) Trapezoidal

99. A resistor connected across the gate and cathode of a thyristor increase its:

(A) Turn off time
(B) di/dt rating
(C) Noise immunity
(D) Holding current

100. P-side emitter in UJT is___

(A) Not doped
(B) Feebly doped
(C) Heavily doped
(D) Moderately doped

******

Rough Work / रफ कार्य

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