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प्रश्नपुस्तिका क्रमांक
Question Booklet No.

O.M.R. Serial No. | | | | | | | | |

प्रश्नपुस्तिका सीरीज
Question Booklet Series
D

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।

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।**

506

1. 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
2. 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
3. The input control parameter of a JFET is _____.
   (A) Gate voltage
   (B) Source voltage
   (C) Drain voltage
   (D) Gate current
4. 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
5. 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
6. 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

7. 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

8. A JFET is also called _____transistor:

(A) unipolar

(B) bipolar

(C) unijunction

(D) None of the above

9. A JFET is similar in operation to _____Valve:

(A) Diode

(B) Pentode

(C) Triode

(D) Tetrode

10. A JFET has three terminals, namely _____.

(A) cathode, anode, grid

(B) emitter, base, collector

(C) source, gate, drain

(D) None of the above

11. The input gate current of a FET is _____.

(A) A few micro-amperes

(B) A few mili-amperes

(C) A few amperes

(D) Negligible

12. 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

13. Transistor is a device which is a_____.

(A) Transferring voltage device

(B) Current operated one

(C) Power operated one

(D) Voltage operated one

14. 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

15. 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

16. 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

17. _____ transistor is affected by static electricity:

(A) N-P-N transistor

(B) UJT

(C) FET

(D) MOSFET

18. 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

19. The BJT was invented by _____.

(A) W. H Brattin

(B) Bardeen

(C) William Shockley

(D) All of the above

20. 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

21. The transistor acts as an amplifier in the _____region.

(A) Cut off

(B) Active

(C) Saturation

(D) None of the above

22. 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

23. 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

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

(A) 90

(B) 120

(C) 270

(D) 180

25. 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

26. Transistor biasing represents _____ condition.

(A) ac

(B) Both ac and dc

(C) dc

(D) None of the above

27. The value of alpha of a transistor is _____.

(A) 0

(B) 1

(C) More than 1

(D) Less than 1

28. In an NPN transistor, _____ are the minority carrier.

(A) Electron

(B) Holes

(C) Donor ions

(D) Acceptor ions

29. The input impedance of a transistor is _____ as compared to MOSFET.

(A) Low

(B) High

(C) Very high

(D) None of above

30. The emitter of a transistor is _____ doped.

(A) Heavily

(B) Moderately

(C) Lightly

(D) None of above

31. 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

32. 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

33. 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

34. In a BJT the base current (I_B) is about _____ of emitter current (IE).

(A) 5%

(B) 20%

(C) 25%

(D) 35%

35. 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

36. 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

37. 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

38. 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

39. 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

40. 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

41. 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

42. 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

43. The current obtained from a filterless rectifier is_____.

(A) an eddy current

(B) sinusoidal current

(C) varying direct current

(D) constant direct current

44. The leakage current in a pn junction is of the order of _____.

(A) Kamp

(B) Amp

(C) Miliamp

(D) None of above

45. A pn junction acts as a _____.

(A) Controlled Switch

(B) Unidirectional Switch

(C) Bidirectional Switch

(D) None of above

46. In a semiconductor, current conduction is due to _____.

(A) Holes

(B) Free electrons

(C) Holes and Free electrons

(D) None of above

47. 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

48. The most commonly used semiconductor is _____.

(A) Germanium

(B) Silicon

(C) Carbon

(D) Sulpher

49. A semiconductor has _____ temperature coefficient of resistance.

(A) Positive

(B) Negative

(C) Zero

(D) None of above

50. A semiconductor is formed by _____ bonds.

(A) Covalent

(B) Electrovalent

(C) Co-ordinate

(D) None of above

51. P-side emitter in UJT is___

(A) Not doped

(B) Feebly doped

(C) Heavily doped

(D) Moderately doped

52. 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

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

(A) Sine wave

(B) Square Wave

(C) Sawtooth wave

(D) Trapezoidal

54. Inverter converts:

(A) DC to AC

(B) AC to DC

(C) DC to DC

(D) AC to AC

55. 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

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

(A) 0.5

(B) 1

(C) 2.7

(D) 5

57. Chopper control for DC motor provides variation in _____.

(A) Input voltage

(B) Frequency

(C) Current

(D) None of the above

58. 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

59. 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

60. Power electronics convert _____ energy into another form of energy.

(A) Electrical

(B) Mechanical

(C) Solar

(D) All of above

61. In Ac voltage regulator, TRIACS cannot be used for a_____.

(A) Back emf load

(B) Resistive load

(C) R-L Load

(D) Inductive load

62. For the high-frequency choppers, the device that is preferred is_____.

(A) TRIAC

(B) Thyristor

(C) Transistor

(D) GTO

63. 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

64. A device that cannot be triggered with low voltage of either polarity is _____.

(A) Diac

(B) Triac

(C) SCS

(D) None of the above

65. A thyristor equivalent of a thyratron tube is a _____.

(A) Diac

(B) Triac

(C) Silicon controlled rectifier

(D) None of the above

66. 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

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

(A) Diac

(B) Triac

(C) SUS

(D) None of the above

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

(A) Thyristor

(B) Triac

(C) G.T.O

(D) MOSFET

69. 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

70. A silicon controlled rectifier (SCR) is_____.

(A) Unijunction device

(B) Device with three junction

(C) Device with four junction

(D) None of the above

71. Full form of SONAR is _____.

(A) sound navigate resonance

(B) sound near rectification

(C) Sound Navigation and ranging

(D) sound navigate resistance

72. Tunnel diode does not exhibit_____.

(A) Positive resistance

(B) Negative resistance

(C) Both

(D) None of the above

73. 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

74. Klystron operates on the principle of _____.

(A) Amplitude Modulation

(B) Frequency Modulation

(C) Pulse Modulation

(D) Velocity Modulation

75. 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

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

(A) Travelling wave tube

(B) Magnetron

(C) Reflex Klystron

(D) Gunn diode

77. 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

78. 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

79. 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

80. 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

81. Microwave antenna aperture efficiency depends on:

(A) Feed Pattern

(B) Antenna Aperture

(C) Surface losses

(D) Low side lobe level

82. 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

83. 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

84. 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

85. The major advantage of TWT over Klystron is _____.

(A) Higher gain

(B) Higher frequency

(C) Higher output

(D) Higher bandwidth

86. In Microwave we consider the elements as_____.

(A) Lumped circuit elements

(B) Distributed circuit elements

(C) Both are correct

(D) None of these

87. In microwave range most noisy semiconductor device is_____.

(A) IMPATT

(B) TRAPATT

(C) GUN

(D) TUNNEL DIODE

88. Microwave Semiconductor devices are _____.

(A) Positive resistance

(B) Negative resistance

(C) Zero resistance

(D) High resistance

89. 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

90. Gunn diode can be operated in _____.

(A) Three different modes

(B) Two different modes

(C) Four different modes

(D) No mode

91. 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

92. 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

93. 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

94. 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

95. In class A operation, the input circuit of a JFET is _____biased:

(A) Forward

(B) Reverse

(C) Not

(D) None of the above

96. 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

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

(A) JFET

(B) MOSFET

(C) Crystal diode

(D) Ordinary transistor

98. 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

99. 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

100. 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

******

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