60613

ROLL No. | | | | | |

TEST BOOKLET No. 201

TEST FOR POST GRADUATE PROGRAMMES

ELECTRONIC SCIENCE

Time: 2 Hours

Maximum Marks: 450

INSTRUCTIONS TO CANDIDATES

1. You are provided with a Test Booklet and an Optical Mark Reader (OMR) Answer Sheet to mark your responses. Do not soil the Answer Sheet. Read carefully all the instructions given on the Answer Sheet.
2. Write your Roll Number in the space provided on the top of this page.
3. Also write your Roll Number, Test Code, and Test Subject in the columns provided for the same on the Answer Sheet. Darken the appropriate bubbles with a Ball Point Pen.
4. The paper consists of 150 objective type questions. All questions carry equal marks.
5. Each question has four alternative responses marked A, B, C and D and you have to darken the bubble fully by a Ball Point Pen corresponding to the correct response as indicated in the example shown on the Answer Sheet.
6. Each correct answer carries 3 marks and each wrong answer carries 1 minus mark.
7. Space for rough work is provided at the end of this Test Booklet.
8. You should return the Answer Sheet to the Invigilator before you leave the examination hall. However, you can retain the Test Booklet.
9. Every precaution has been taken to avoid errors in the Test Booklet. In the event of any such unforeseen happenings, the same may be brought to the notice of the Observer/Chief Superintendent in writing. Suitable remedial measures will be taken at the time of evaluation, if necessary.

ELECTRONIC SCIENCE

1. The forbidden gap in the energy band of Silicon is

   (A) 0.1 eV
   (B) 0.7eV
   (C) 1.1 eV
   (D) 2.1 eV

2. Order of current under reverse bias of a Silicon pn diode is

   (A) zero
   (B) 1 nano Amp
   (C) 1 micro Amp
   (D) 1 milli Amp

3. With reverse bias voltage reverse current in pn diodes varies

   (A) linearly
   (B) exponentially
   (C) logarithamically
   (D) negligibly

4. Current conducted by a Si pn diode under 0.3 V forward bias is of order

   (A) zero
   (B) micro Amps
   (C) milli Amps
   (D) depends on temperature

5. The relationship of current through a Si pn diode and forward bias voltage is

   (A) linear
   (B) exponential
   (C) circular
   (D) inversely proportional

6. A Zener diode conducts current

   (A) in both directions
   (B) only in forward direction
   (C) under constant voltage
   (D) in pulses

7. A Si junction diode exhibits properties of

   (A) resistance only
   (B) capacitance
   (C) inductance
   (D) current source

8. Si devices can be used only upto a frequency of

(A) 1 MHz (B) 10 MHz
(C) 100 MHz (D) 1 GHz

9. The number of junctions in a transistor is

(A) one (B) two
(C) three (D) four

10. Number of junctions in a tunnel diode is

(A) one (B) two
(C) three (D) four

11. Source current in a MOSFET depends on the voltage between

(A) source and drain (B) source and gate
(C) drain and gate (D) supply voltage

12. In a BJT, power gain is maximum in the configuration

(A) Common Collector (B) Common Emitter
(C) Common Base (D) Cascode

13. In a CE, RC coupled transistor amplifier low frequency cut off is determined by

(A) coupling capacitor (B) emitter bypass capacitor
(C) collector resistance (D) bias net work

14. Input impedance of common collector amplifier is

(A) high (B) moderate similar to CE
(C) low (D) zero

15. When compared to BJT, FET frequency response is

(A) wider
(B) narrower
(C) same
(D) depends on the circuit

16. Temperature can be sensed using

(A) only a thermocouple
(B) transistor
(C) copper strip
(D) FET

17. In a CE transistor, collector current changes by 1 mA for a base current change of 10 micro amp. This can give the hybrid parameter

(A) hoe =100 mho
(B) hre =100
(C) hfe =100
(D) hie =100 ohm

18. A transistor amplifier has a voltage gain of 10. With negative voltage feed back of feed back ratio 0.001, its bandwidth will be

(A) same
(B) smaller
(C) larger
(D) not related to fb

19. An SCR conducts current of 200 mA when its gate voltage is 4 volt wrt cathode. If the gate voltage falls to 2 volt, the collector current will be

(A) 200 mA
(B) 100 mA
(C) 50 mA
(D) zero

20. A TRIAC is a device which can be used to

(A) amplify low frequency signals
(B) control power
(C) produce square waves
(D) amplify signals at high frequencies

21. A source delivers maximum power at 1Amp into a load. Its internal resistance is 10 ohms. Its voltage output

(A) cannot be determined (B) will be arbitrary
(C) will be 10 volts (D) will be 20 volts

22. A DC source 10 volts is connected to a series combination of 10 ohm and a 1 Farad capacitor. The current through the circuit at 10 secs after switching on will be

(A) zero Amp (B) 0.66 Amp
(C) 1 Amp (D) infinity

23. An AC source 10 volts, 1590 Hz is connected to a series combination of 10 ohm and a 1 Farad capacitor. The current through the circuit at 10 secs after switching on will be

(A) zero Amp (B) 0.66 Amp
(C) 1 Amp (D) infinity

24. An AC source 10 volts, 1590 Hz is connected to a series combination of 10 ohm, a 1 microFarad capacitor and a 10 milli Henry inductance. The current through the circuit at 10 secs after switching on will be

(A) zero Amp (B) 0.66 Amp
(C) 1 Amp (D) infinity

25. An AC source 10 volts, 1590 Hz is connected to a parallel combination of 10 ohm, a 1 microFarad capacitor and a 10 milli Henry inductance. The current through the circuit at 10 secs after switching on will be

(A) zero Amp (B) 0.66 Amp
(C) 1 Amp (D) infinity

26. An AC source 10 volts, 1590 Hz is connected to a series combination of a 1 microFarad capacitor and a 10 milli Henry inductance. The current through the circuit at 10 seconds after switching on will be

(A) zero Amp (B) 0.66 Amp
(C) 1 Amp (D) infinity

27. An AC source 10 volts, 1590 Hz is connected to a parallel combination of a 1 microFarad capacitor and a 10 milli Henry inductance. The current through the circuit at 10 seconds after switching on will be

(A) zero Amp (B) 0.66 Amp
(C) 1 Amp (D) infinity

28. A ideal voltage source has to provide to a load varying from 120 ohm to 1500 ohm. Its internal impedance should be

(A) zero ohms (B) 120 ohm or 1500 ohm
(C) Sq Rt of 120 – 1500 ohm (D) infinity

29. Sound waves propagate in free space with a velocity of

(A) 1500 m/s (B) 3×10000 m/s
(C) light (D) zero m/s

30. Radio frequency waves propagate in free space with a velocity

(A) proportional to their frequency
(B) equal to that of light
(C) depending on permitivity
(D) proportional to power radiated

31. Wavelength corresponding to 8.2GHz is

(A) 36.6 cm (B) 3.66 cm
(C) 0.366 cm (D) 366 cm

32. Radio Frequency Signals are capable of propagating through Earth with a velocity

(A) of light
(B) of light but get attenuated
(C) zero
(D) infinity

33. A signal at 1 MHz and another at 3 MHz are travelling through the same conductor. The result will be a signal at

(A) (1 + 3) MHz
(B) (3 – 1) MHz
(C) 1 MHz and 3 MHz
(D) 4 MHz and 2 MHz

34. Modulation of audio signals over high frequency carrier is required because

(A) efficiency of audio is low
(B) audio cannot cover large distances due to attenuation
(C) high frequency carrier can travel long distance
(D) high frequency can easily be generated

35. In amplitude modulation, modulated signal comprises

(A) carrier, upper and lower side bands
(B) upper sideband
(C) lower sideband
(D) upper and lower sideband

36. An AM transmitter radiates 15 k watts power. If modulation is 100%, power in lower sideband is

(A) 1.25 kW
(B) 2.5 kW
(C) 5 kW
(D) 10 kW

37. A single sideband AM transmitter radiates 10 kW. The power at carrier frequency is

(A) 5 kW
(B) 2.5 kW
(C) zero
(D) small, only pilot carrier power

38. Frequency modulation results in a signal which needs larger band width than twice modulating signal. This statement is TRUE

    (A) always
    (B) for large power signals only
    (C) for small modulation index
    (D) for large modulation index

39. Frequency modulated signals can be radiated only by

    (A) vertical dipoles
    (B) horizontal dipoles
    (C) Yagi antennas
    (D) Any of these

40. When compared to AM of equal power, FM coverage is

    (A) always less
    (B) always larger
    (C) limited by line of sight
    (D) all round

41. Antennas to receive FM transmission are

    (A) verticaly polarised
    (B) horizontally polarised
    (C) circularly polarised
    (D) sometimes directional

42. RADAR uses microwave frequencies since

    (A) large power can be generated
    (B) directional radiation can be achieved easier
    (C) interference is minimal
    (D) range accuracy is good

43. For microwave frequencies most appropriate transmission lines are

    (A) two wire open lines
    (B) shielded cables
    (C) wave guides
    (D) fibre

44. For propagation at microwave frequencies a wave guide allows frequencies

(A) higher than a cut off
(B) lower than a cut off
(C) of all ranges
(D) which are resonant

45. A rectangular wave guide has dimensions 1.5×0.5 cms. It can support propagation of microwave signals at

(A) 1 GHz
(B) 5 GHz
(C) 10 GHz
(D) visible light frequencies

46. The main purpose of the helix in a TWT is to

(A) reduce axial velocity of RF field
(B) ensure broad band operation
(C) prevent electron beam from spreading
(D) reduce noise figure

47. GUNN diode is a device

(A) for switching
(B) generating square waves
(C) rectifying micro waves
(D) generating micro waves

48. The type of modulation possible at micro wave frequencies is

(A) AM
(B) FM/PM
(C) pulse modulation
(D) all types

49. Shielded cables are used at high frequencies to

(A) optimise power transfer
(B) minimise radiation
(C) protect cable from bending
(D) minimise VSWR

50. Microwave frequencies are used for satellite communication because they

(A) need devices small in size
(B) can penetrate through ionosphere
(C) can travel with velocity greater than light velocity in free space
(D) are unaffected by noise

51. An amplifier shows a gain of 1000 at 4 kHz, 707 at 7.1 kHz and at 100 Hz. Its bandwidth is

(A) 4 kHz (B) 7 kHz
(C) 7.1 kHz (D) 100 Hz

52. A symmetric two port network has series arms and shunt arm 120 ohms. Then its characteristic impedance is

(A) 60 ohms (B) 120 ohms
(C) 240 ohms (D) 360 ohms

53. Two resistances R1 and R2 are connected in parallel across a battery of 6 V with internal resistance R0. R1 is found to dissipate 3 watts while R2 dissipates half of this value. Then R0 =

(A) 0.5 ohm (B) 1 ohm
(C) 1.5 ohm (D) 2 ohm

54. A 10 ohm resistance is connected in series with an inductance L=100 mHenry and a capacitance C = 0.1 micro Farad to a 10 V, ac source. At a frequency of 1590 Hz the resistance dissipates 10 Watts. At a frequency of 3180 Hz the resistance dissipates

(A) 5 watts (B) less than 10 watts
(C) 10 Watts (D) 20 watts

55. A 10 ohm resistance is connected in series with an inductance L=100 mHenry and a capacitance C = 0.1 micro Farad to a 10 v, ac source. At a frequency of 1590 Hz the resistance dissipates 10 Watts. The voltage across the inductance at this frequency is

(A) less than 10 v
(B) 10 v
(C) 50 v
(D) 100 v

56. A 10 ohm resistance is connected in series with an inductance L=100 mHenry and a capacitance C = 0.1 micro Farad to a 10 v, ac source. At a frequency of 1590 Hz the resistance dissipates 10 Watts. The voltage across the resistance at this frequency is

(A) less than 10 v
(B) 10 v
(C) 50 v
(D) 100 v

57. A current 1 Amp passes through an inductance L = 1 H. The energy stored in L is

(A) 0.5 J
(B) 0.5 J if current is AC
(C) 0.5 J if current is DC
(D) zero

58. A current 1 Amp passes through an inductance L = 1 H. The power dissipated in L is

(A) zero Watt
(B) 0.5 Watt
(C) 1 Watt
(D) 2 Watt

59. In an RC coupled transistor CE amplifier, an un-bypassed emitter resistance will lead to

(A) shift in quiescent point
(B) fall in input impedance
(C) fall in output impedance
(D) reduction in gain

60. The main disadvantage of CW Doppler radar is that

(A) it does not give target velocity
(B) it does not give target range
(C) a transponder is required at target
(D) All of the above are disadvantages

61. What is the most noticeable effect of a small increase in temperature in the common emitter connected BJT?

(A) Increase in output resistance
(B) Increase in I_{CEO}
(C) Increase in forward current gain
(D) Decrease in forward current gain

62. When compared with a BJT amplifier the input impedance of an FET amplifier stage is

(A) same (B) smaller
(C) larger (D) 10% larger

63. A thin base region in a transistor will provide

(A) larger power (B) larger current gain
(C) smaller gain (D) higher speed

64. Increasing the doping concentration in a pn diode will lead to

(A) tunneling (B) Zener effect
(C) break down (D) thermal stability

65. In an n type MOSFET the majority carriers are

(A) electrons (B) holes
(C) electrons and holes (D) absent

66. In a semiconductor junction with no applied bias, charge carriers

(A) face a potential well
(B) jump from valence to conduction band
(C) fall from conduction to valence band
(D) remain bound to their parent atoms

67. When reverse bias voltage is applied to a Zener diode, electrons on the p side

(A) oppose the bias (B) assist the bias
(C) cross the barrier (D) stay on n side

68. In a tunnel diode electrons on the p side and holes on the n side can

(A) cross the forbidden gap
(B) pass through the gap to other side
(C) pass through the gap to available sites on the other side
(D) pass through the gap to available sites on the other side on forward bias

69. In a Reflex Klystron oscillation occurs because

(A) electron beam is highly focused
(B) electrons repel each other
(C) velocity modulation occurs
(D) density modulation occurs

70. A transistor like BC107 can work at frequencies of order

(A) 2 MHz (B) 20 MHz
(C) 200 MHz (D) 2000 MHz

71. Magnetron is a device which provides

(A) high magnetic fields
(B) large amplification and oscillation at 100 MHz only
(C) oscillation at GHz
(D) high frequency magnetic field

72. Open wires cannot be used at frequencies of order 500MHz because

(A) this frequency is for military usage
(B) wires must be very thick
(C) they get heated due to skin effect
(D) radiation losses occur

73. Microwave devices normally work with

(A) AC power supply (B) DC power supply
(C) switched power (D) very high frequency power

74. VHF devices need cooling since

(A) these are bulky (B) these are usually thermionic
(C) skin effect is present at VHF (D) electrodes damage

75. In transistors operating speed is limited by

(A) Vcc (B) base voltage
(C) junction temperature (D) doping level

76. When compared to a BJT the speed performance of an FET is

(A) inferior (B) superior
(C) the same (D) 1.1 times better

77. An LED is a device which can be used to

(A) amplify low frequencies (B) amplify high frequencies
(C) indicate state of signal (D) provide audio alarm

78. Devices used in most digital circuits are

(A) transistors only (B) FETs only
(C) transistors and FETs (D) LCDs

79. Binary digital circuits as in computers use

(A) 0s and 1s (B) two level voltages
(C) On – OFF relays (D) SCRs

80. Most digital circuits operate with Vcc of 5 volts since

(A) 5V is easily generated from battery
(B) most ICs are manufactured for 5V
(C) noise margin is good
(D) 0 and 1 are 0V and 5V, as per international standards

81. A and B are binary variables. Then A + A' is

(A) 0 (B) 1
(C) A (D) X (don't care)

82. A and B are binary variables. Then (A + B) ' =

(A) 0 (B) 1
(C) A + B' (D) A' . B'

83. Binary representation of decimal number 14 is

(A) 0001 0100 (B) 1110
(C) E (D) F

84. What is the typical value for the ratio of current in a p-n junction diode in the forward bias with that in the reverse bias?

(A) 1 (B) 10
(C) 100 (D) 1000

85. The logic function ABC + AB' + ABC' is equivalent to

(A) A (B) B
(C) ABC (D) 1

86. A logic circuit which can identify when two variables A and B are not similar is

(A) OR gate (B) AND gate
(C) EXOR gate (D) EXNOR gate

87. A logic circuit which can identify when two variables A and B are similar is

(A) OR gate (B) AND gate
(C) EXOR gate (D) EXNOR gate

88. The number of bits in a product of two non zero binary numbers with 5 and 7 bits is

(A) 5 (B) 7
(C) 7 + 1 (D) 5 + 7 – 1 or more

89. In TTL logic circuits the 0 and 1 levels are respectively

(A) below 0 and above 5
(B) 0 and 1 volts
(C) 0.8 volts and 3.2 volts
(D) 0.8 volts and below and 3.2 volts and above

90. Twos complement representation is used in computers to perform arithmetic on

(A) + ve and –ve decimal numbers
(B) fractions
(C) + ve and –ve binary numbers
(D) only on floating point numbers

91. A floating point representation has

(A) + or – sign and value
(B) exponent and magnitude
(C) biased exponent and magnitude
(D) biased exponent and magnitude as fraction

92. The range of an 8 bit binary number in microprocessors can represent the range

(A) 0 – 255 decimal (B) – 127 to + 128
(C) 0 to 2 power 8 (D) 0 –128

93. Current day microprocessors work at clock speeds upto

(A) 1 MHz (B) 10 MHz
(C) 100 MHz (D) 1 GHz and above

94. The main memory of modern day computers is

(A) semi conductor (B) magnetic core
(C) magnetic Tape (D) CCD

95. One important limit to speed of operation of computers is

(A) access time of memory
(B) density of devices in CPU
(C) speed of peripherals like printers
(D) speed of display devices

96. Digital computers can perform only

(A) addition and logic operations
(B) addition, logic operations and calculus
(C) with the help of algorithms any mathematical operation
(D) text processing in addition to all these with suitable codes

97. The number of distinct elements that Boolean algebra can have is

(A) 2 (B) 3
(C) 4 (D) any

98. 8085 is an eight bit microprocessor. It implies that for this microprocessor

(A) address and data bus are 8 bit
(B) data is in terms of 8 bits
(C) ALU can operate on 8 bit numbers
(D) address bus is 8 bit

99. A computer has a main memory RAM of 8192 bytes. Time taken to access location number 10 is 100 nano second. Then time taken to access location number 1000 is

(A) 100 nano second (B) 1 micro second
(C) 10 micro second (D) 1 milli second

100. Fastest type of memory for digital computers is

(A) Compact Disc (B) Hard Disc
(C) Magnetic tape (D) Semiconductor

101. Circuits in a digital computer use ICs with devices like transistors and FETs and operate at clock speeds in many MHz. Power supply for these circuits are usually

(A) 220 AC, 50 Hz (B) 220 DC
(C) AC of frequency MHz (D) DC

102. An operational amplifier performs

(A) mathematical operation
(B) logic operation like AND, OR etc
(C) amplification of low frequency signals only
(D) data conversion

103. The open loop gain of an op-amp like 741 is of order

(A) 100 (B) 1000
(C) 10000 (D) 100000

104. The open loop bandwidth of an op-amp like 741 is of order

(A) 10 Hz (B) 100 Hz
(C) 1 K Hz (D) 100 KHz

105. The input impedance of an op-amp is of the order of

(A) 100 ohm (B) 1 k ohm
(C) 100 k ohm (D) 10 M ohm

106. An op-amp integrates the input fed at inverting terminal by connecting in the feed back path

(A) a suitable resistance (B) an inductance
(C) a capacitor (D) diode connected transistor

107. Op-amp 741 is connected as unity gain inverting amplifier. Slew rate is specified as 0.5V/microsec. The inverting voltage input changes by 10 Volts. Then the output voltage will change to 10 volts

(A) instantly
(B) after 5 micro sec
(C) after 20 micro sec
(D) after delay depending on the input waveform

108. Cut off frequency of a first order low pass filter for $R_1 = 2.5k\Omega$ and $C_1 = 0.05\mu F$ is

(A) 1.273 kHz (B) 12.73 kHz
(C) 127.3 kHz (D) 127.3 Hz

109. An op-amp is connected as an integrator with feed back resistance R and capacitance C. A square wave is fed to its inverting input. Then the output will be triangular wave if input

(A) period is less than ½.pi. RC
(B) period is more than ½ .pi. RC
(C) voltage is greater than off set
(D) voltage is less than off set

110. The output is connected to the inverting input of a 741 op-amp. A sinusoidal input of 1 volt, 1kHz is connected to the non inverting input through a 10 K ohm resistance. The out put is then of the order of

(A) 1 volt, input impedance 10 k ohm
(B) 10 volt, input impedance 10 k ohm
(C) 1 volt, input impedance 100 k ohm
(D) 1 volt, input impedance 1 M ohm

111. The output of an op-amp integrator is connected to another op-amp integrator whose output is connected back to the first integrator. This will provide an output of

(A) highly stable original signal
(B) sinusoidal oscillation
(C) highly amplified signal
(D) perfect integrated input

112. The input current drawn by a unity gain op-amp like 741 is

(A) 1 micro amp (B) 1 milli amp
(C) order of collector current (D) negligible

113. The output impedance of an op-amp is of the order of

(A) few ohms (B) k ohms
(C) mega ohms (D) infinity

114. A transistor Common Emitter RC coupled amplifier has voltage gain of 50 and a current gain of 20. An input signal at 1 volt and current 0.1 milli amp is applied to this stage. The output power is

(A) 1 milli watts (B) 10 milli watts
(C) 100 milli watts (D) distorted

115. An inverting op-amp 741 has a closed loop gain of 200. A sinusoidal input 1 volt at 1 k Hz is applied to its inverting input. If the supply voltage is Vcc, the output will be

(A) cosinusoidal 10 volt, 1 kHz
(B) sinusoidal 200v, 1 kHz
(C) near square wave, at Vcc , 1 kHz
(D) triangular, Vcc, 1 kHz

116. Cathode ray oscilloscopes provide

(A) visual displays
(B) audio output
(C) deflection of needle
(D) both audio and video output

117. An electron is released at the bottom plate of two parallel plates spaced 1 cm and the upper plate at 200volts with reference to the lower plate. Then the electron will gain an energy of

(A) 200 eV
(B) 5.93×200
(C) $200 \times c$ ev where c is velocity of light
(D) 5.93×14.1 eV

118. In a CRO to observe wave forms a sawtooth voltage is applied to

(A) vertical deflection plates
(B) horizontal deflection plates
(C) between cathode and anode
(D) the phosphor of the screen

119. In oscilloscopes with deflection sensitivity 10mV/cm the input signal should supply

(A) zero current
(B) current proportional to the voltage
(C) 1 mV for deflection of 1 cm
(D) 10 mV for deflection 1 cm

120. Stable waveforms can be observed on CRO screens if the frequency of horizontal sweep input are

(A) same
(B) related by integer multiple
(C) related by integer multiple and the screen has persistence
(D) related by integer multiple and the screen has persistence and signal level is above a threshold

121. The solution to simultaneous equations in two variables requires

(A) one unique equation
(B) two independent equations
(C) specific boundary conditions
(D) matrix of rank 1

122. Simultaneous algebraic equations in two variables can be solved using operational amplifiers interconnected as

(A) integrators
(B) differentiators
(C) summing amplifiers
(D) multipliers

123. $x(t)$ is a function of time. When differentiated twice gives $x(t)$ as a result. Then $x(t)$ is

(A) a constant
(B) $= t$
(C) $= t$**2
(D) $\sin k\,t$, where $k =$ constant

124. Amplifier responses are plotted in log freq Vs gain so that

(A) errors are minimised
(B) frequency scale need not start at zero
(C) large frequency range can be covered
(D) log is a liner operator

125. A transistor amplifier has a voltage gain of 100. Its power gain in dB is

(A) 10 dB
(B) 20 dB
(C) 30 dB
(D) 40 dB

126. Directivity of an isotropic antenna is

(A) 0 dB (B) 1 dB
(C) −1 dB (D) 10 dB

127. The voltage developed across a load at a frequency 1kHz is 10 volts. At 2kHz it is 7.07. Then power delivered is at

(A) − 3 dB (B) −6 dB
(C) 0 dB (D) 3 dB

128. A matrix has its 1st row as 0,1. Its second row is 1,0. Its transpose is then

(A) same (B) undefined
(C) undefined since rank is zero (D) both rows 1,0 and 1,0

129. Two complex numbers 2 + j 3 and 2 − j 3 are multiplied. The result is

(A) 4 − j9 (B) 4 + j 9
(C) 4 − 9 (D) 4 + 9

130. The current in an inductor with reference to the voltage across it

(A) lags by 180 deg (B) leads by 180 deg
(C) lags by 90 deg (D) leads by 90 deg

131. Current through a resistance in a series L,C,R circuit with respect to voltage across it

(A) is in phase (B) leads
(C) lags (D) is in phase at resonance

132. Two inductances 100 m Henry and 200 m Henry are connected in parallel. This will result in an inductance of

(A) 200/ 300 m Henry (B) 300 m Henry
(C) 200 − 100 = 100 m Henry (D) 200 m Henry

133. A matrix has 4 rows – {1,2,3,4} {3,2,4,2}, {2,4,6,8}, {5,6,7,0}. Its rank is

(A) 4
(B) 3
(C) 2
(D) 1

134. The output of a transistor CE amplifier and its input are

(A) in phase
(B) out of phase
(C) in phase in mid frequency
(D) out of phase in mid frequency

135. An L,C,R circuit draws a current of 10 m A at 1 kHz. The current drawn lags the voltage applied by 30 degrees. Voltage across the resistance R = 10 ohm is 10 volts. Power dissipated in the resistance is then

(A) 0.1 watt
(B) $0.1 \times \cos 30$
(C) $0.1 \times \sin 30$
(D) zero

136. Two 4×4 matrices A and B are multiplied. The result is an identity matrix. Then

(A) B is transpose of A
(B) A is transpose of B
(C) B is inverse of A
(D) B is hermitian of A

137. Two matrices can be multiplied only if

(A) they are both real
(B) number of rows of first equals number of columns of the second
(C) number of columns of first equals number of rows of the second
(D) they are square matrices

138. The matrix whose off diagnol elements are zero

(A) has no inverse
(B) is its own inverse
(C) has rank zero
(D) has rank one less than number of rows

139. Hybrid parameters of a CE transistor contains 4 elements in two rows which are

(A) impedances
(B) voltage ratios
(C) two ratios, one impedance and one admittance
(D) one voltage ratio, one current ratio, one impedance and one conductance

140. At high frequencies a CE transistor amplifier exhibits

(A) large attenuation
(B) instability
(C) large power dissipation
(D) phase shift greater than 180 deg

141. A system is described by its transfer function which has poles at −1, +1 and zeros at 0 and 2. The system is

(A) stable since poles are not greater than 1
(B) unstable since zero is at 2
(C) unstable due to pole at +1
(D) stable since Nyquist criterion is satisfied

142. An amplifier has a gain of 200. It has a positive feed back of 0. 5. This system will

(A) oscillate as Barkhausen criterion is satisfied
(B) oscillate because positive feed back exists
(C) larger band width than without feed back
(D) smaller gain than without feed back

143. Negative feed back in amplifier circuits introduces

(A) instability
(B) distortion only
(C) stability only
(D) stability as also reduces distortion

144. Oscillator circuits will always produce

(A) sinusoidal out put only
(B) steady DC plus saw tooth
(C) square waves or sinusoidal outputs
(D) damped sine waves

145. The Fourier transform of a steady DC is

(A) zero
(B) linearly increasing
(C) circle
(D) pulse at zero

146. The Fourier transform of a time function $x(t)$ is

(A) real and symmetric
(B) complex
(C) exponential function
(D) constant

147. The Laplace transform of a time function $x(t)$ = constant, $t >= 0$ is

(A) constant
(B) 1 / s
(C) 1 / s + 1
(D) s

148. The Laplace transform of the impedance of an inductance L at frequency f is, (where w is radian frequency, s is Laplace operator)

(A) j wL
(B) 1/ jwL
(C) 1/sL
(D) sL

149. The response of a circuit to DC of 1 volt is given by 1/s + 3. In time domain it is

(A) sin 3t
(B) DC of 3 volt
(C) exp (–3t)
(D) exp (+ 3t)

150. Transfer function of a system is given by H = 1/ (s – 2) (s – 1) (s + 1). The system is

(A) oscillatory
(B) unstable
(C) stable
(D) conditionally stable

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