MIZORAM PUBLIC SERVICE COMMISSION

TECHNICAL COMPETITIVE EXAMINATIONS FOR RECRUITMENT TO THE POST OF GRADE-V OF MIZORAM ENGINEERING SERVICE (AE/SDO) UNDER POWER & ELECTRICITY DEPARTMENT, GOVERNMENT OF MIZORAM JANUARY, 2012

ELECTRONICS ENGINEERING

PAPER – I

Time Allowed : 3 hours Full Marks : 200

All questions carry equal marks of 1 each.
Attempt all questions.

1. Find the wrong statement: specific heat of a material is
(a) constant
(b) heat capacity per unit mass
(c) extrinsic property
(d) of units as Joule/Kg-K

2. Metals have thermal conductivities in the range of
(a) < 1
(b) 1-5
(c) 5-25
(d) 20-400

3. For carbon resistors what is the color for 5?
(a) green
(b) black
(c) orange
(d) gray

4. The four stripes of a resistor are yellow-violet-orange-gold. The value of the resistance should be
(a) 470Ω ± 5%
(b) 47KΩ ± 5%
(c) 47MΩ ± 5%
(d) 47KΩ ± 10%

5. In a nickel-cadmium-alkali cell the electrolyte is
(a) sulphur acid
(b) potassium hydroxide
(c) zinc chloride
(d) ammonium chloride

6. Resistivity of a wire depends on
(a) length
(b) material
(c) cross sectional area
(d) none of these

7. Resistance of a wire is r ohms. The wire is stretched to double its length then its resistance in ohms is
(a) r/2
(b) 4r
(c) 2r
(d) r/4

8. The mass of a proton is roughly how many times the mass of an electron?
(a) 184,000
(b) 18,400
(c) 1,840
(d) 184

9. Two bulbs marked 200 watt - 250 Volts and 100 watt - 250 Volts are connected in series to 250 Volts supply. Power consumed in circuit is
(a) 33 watt (b) 66.667watt
(c) 100 watt (d) 300 watt

10. When P=power, V= voltage, I= current, R=resistance and G= conductance. Which of the following relation is incorrect?
(a) $V = \sqrt{(PR)}$ (b) $P = V^2G$
(c) $G = P/I^2$ (d) $I = \sqrt{(P/R)}$

11. The unit of electrical conductivity is
(a) mho/meter (b) mho/m^2
(c) ohm/m (d) ohm/m^2

12. The element of electric heater is made of
(a) copper (b) steel
(c) carbon (d) nichrome

13. Which of the following materials is not used as a fuse material?
(a) silver (b) copper
(c) aluminium (d) carbon

14. Materials which can store electrical energy are called
(a) magnetic materials (b) semi-conductors
(c) dielectric materials (d) super conductors

15. Which method can be used for absolute measurement of resistance?
(a) Ohm's Law method (b) Wheatstone bridge method
(c) Raleigh method (d) Lorentz method

16. The wave representation of electron
(a) is confirmed by Bragg's Law (b) satisfies Uncertainty principle
(c) represents lowest energy (d) was suggested by Rutherford

17. Ionic bonding in solids depends primarily on
(a) Van der Waals forces (b) electrical dipoles
(c) sharing of electrons (d) transfer of electrons

18. Which of the following materials does not have covalent bonds?
(a) metals (b) diamond
(c) organic polymers (d) silicon

19. The electrostatic nature of ionic bond makes it
(a) directional (b) non-directional
(c) weak (d) related to group IV element

20. The crystal structure of most of the common metal is
(a) hexagonal (b) cubic
(c) orthogonal (d) none of these

199. An electrostatic Voltmeter is suitable for measuring
(a) low voltage at high frequency (b) high voltage
(c) low voltage at low frequency (d) all ac and dc voltages

200. If f(t) = -f(- t) and f(t) satisfies Drichlet conditions then f(t) can be expanded in Fourier series having
(a) sine terms alone (b) cosine terms alone
(c) cosine and constant terms (d) sine and constant terms

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187. RTD is generally suitable for temperature of about
(a) 50ºC (b) 200º C
(c) 800ºC (d) 1500º C

188. If current through the coil of a electromagnet is doubled, then the magnetic field around the coil is
(a) halved (b) doubled
(c) four folded (d) same

189. The Y plates of a CRO are excited by a voltage 2sin(100t) and X plates are not connected. The display would be
(a) a vertical line (b) a horizontal line
(c) a sine wave (d) a slanting line

190. Load cells use
(a) piezo electric effect (b) capacitor
(c) mutual inductance (d) strain gauge

191. It is required to measure temperature in the range of 1300º–1520ºC. The most suitable thermo couple is
(a) chromel- constantan (b) iron-constantan
(c) chromel-alumel (d) platinum-rhodium

192. Which is the displacement transducer with excellent sensitivity, linearity and resolution?
(a) incremental encoder (b) absolute encoder
(c) LVDT (d) strain gauge

193. A digital frequency counter can be converted to DVM by addition of a suitable
(a) VCO (b) D/A converter
(c) power amplifier (d) Op-Amp

194. Which one of the following effects is used in measuring power?
(a) seebeck (b) Ferranti
(c) induction (d) hall

195. Shaft encoder is used to measure
(a) angular position (b) linear position
(c) linear velocity (d) angular velocity

196. The input impedance of a CRO is about
(a) zero (b) 10Ω
(c) 100Ω (d) 1MΩ

197. Which of the following is not a piezo-electric material?
(a) Rochell salt (b) quartz
(c) lithium sulphate (d) sodium-bicarbonate

198. A land line tele-metering system is suitable for distance up to about
(a) 1Km only (b) 10Km only
(c) 100km only (d) any of the above

21. Silica is said to be polymorphic because it
(a) consists of multitude of tiny crystals (b) is found in many shapes
(c) has mixed bonding (d) displays allotropic forms

22. The miller indices are the same for
(a) perpendicular planes (b) crystal planes
(c) parallel planes (d) 3 crystallographic axes

23. Dielectric strength of impregnated paper is
(a) 40-50 KV/cm (b) 200- 300 KV/cm
(c) 500-600 KV/cm (d) 800-900 KV/cm

24. Which of the following does not constitute a point defect in crystal?
(a) self interstitials (b) substitutional atoms
(c) slip lines (d) vacancies

25. Dislocations in material are
(a) point defect (b) line defect
(c) planner defect (d) frenkel defect

26. The permeability and permittivity of a medium are
(a) independent of each other
(b) related by the velocity of electromagnetic wave
(c) related by the Boltzmann's constant
(d) None of the above

27. An element can form a strongly magnetic solid only if its atoms have
(a) an incomplete valence shell (b) an incomplete inner shell
(c) a vacant inner shell (d) none of the above

28. Which of the following expression states Gibb's phase rule?
(a) F = C-P+1 (b) F = C-P+2
(c) F = C-P+3 (d) F = C+P-3

29. Magnetic recording tape is most commonly made from
(a) small particles of iron (b) silicon iron
(c) ferric oxide (d) ferrous oxide

30. Stainless steel are alloys of
(a) iron and nickel (b) iron, chromium and nickel
(c) iron, chromium and molybdenum (d) none of these

31. The number of atoms per unit cell in the F.C.C. structure is
(a) 2 (b) 4
(c) 14 (d) 16

32. Which of the following processes are used to harden steel?
(a) normalizing (b) carburizing
(c) annealing (d) all of these

33. Eutectoid transformation in an alloy is a reaction of which type?
(a) Solid ↔ liquid (b) liquid ↔ liquid
(c) solid ↔solid (d) any of these

34. A TTT diagram is useful for predicting the transformation behaviour of
(a) ferrite (b) austenite
(c) martensite (d) pearlite

35. The main constituent of glass is
(a) SiO_2 (b) B_2O_3
(c) Al_2O_3 (d) none of these

36. The temperature at which a material becomes a glassy solid is called
(a) melting temperature (b) recrystallization temperature
(c) glass transition temperature (d) freezing temperature

37. Polyethylene is produced by
(a) condensation polymerization (b) addition polymerization
(c) co-polymerization (d) all of the above

38. Vulcanized rubber
(a) Is produced from trans-polyisoprene (b) Is alternatively known as neoprene
(c) Contains about 20% sulphur by weight (d) Is produced from cis-polyisoprene

39. The potential energy of an orbiting electron in any atom is
(a) always +ve (b) always –ve
(c) sometimes +ve (d) less than its Kinetic energy

40. An insulator is one whose
(a) valence band is empty (b) conduction band is full
(c) energy gap between the two band is large (d) none of these

41. Intrinsic semiconductor are those which
(a) are available locally (b) are in the purest form
(c) have more electrons than holes (d) have zero energy gap

42. The depletion region of a P-N junction is one that is depleted of
(a) atoms (b) mobile charges
(c) electrons (d) immobile charges

43. For converting intrinsic semiconductor into N type extrinsic semiconductor, which of the following doping element will not be suitable?
(a) arsenic (b) antimony
(c) indium (d) phosphorous

44. At higher forward voltages, a junction diode is likely to
(a) burnout (b) get saturated
(c) suffer breakdown (d) become noisy

175. A moving iron instrument gives correct reading when used at
(a) low frequencies (b) high frequencies
(c) only one frequency (d) any frequencies up to certain value

176. the signal to noise ratio in telemetry should be
(a) 5 dB (b) 10 dB
(c) 25 dB (d) 60 dB

177. A transducer must have
(a) good dynamic response (b) good sensitivity
(c) good resolution (d) all of above

178. Piezo electric effect can be used to measure
(a) force (b) strain
(c) acceleration (d) all of above

179. A resistance strain gauge has a resistance of
(a) 100Ω (b) 25Ω
(c) 10Ω (d) 1Ω

180. The term 'Poisson's ratio' is connected with
(a) strain gauge (b) LVDT
(c) bourden tube (c) thermistor

181. Which bridge can be used to measure frequency?
(a) Maxwell (b) Kelvin
(c) Schering (d) Wien

182. The instrument used to check insulation of household wiring is
(a) megger (b) ohm-meter
(c) multimeter (d) All of above

183. The current in a circuit is measured using a 150:1 CT. If the ohm-meter reads 0.6A, the circuit current is
(a) 250A (b) 90A
(c) 156A (d) 144A

184. To increase the Q factor of a coil, the wire should be
(a) long (b) thin
(c) thick (d) long & thin

185. Which of these has a magnetic brake?
(a) thermo couple ammeter (b) energy meter
(c) dynamometer ammeter (d) frequency meter

186. A 0 – 200V voltmeter has a sensitivity of 1KΩ/V. The resistance of the voltmeter is
(a) 100KΩ (b) 200KΩ
(c) 1KΩ (d) 50KΩ

164. The time base signal in a CRO is
(a) a sinusoidal signal (b) square wave signal
(c) saw tooth signal (d) triangular wave signal

165. The lissajous pattern appearing on the screen of a CRT, when two sinusoidal voltages of equal frequencies, which are in phase with each other are applied to the CRO is
(a) a straight line (b) a circle
(c) an ellipse (d) a parabola

166. In an ideal Op-Amp the voltage gain for the common mode signal is
(a) zero (b) 0.5
(c) 2.0 (d) ∞

167. An Op-Amp has an open loop gain of 10^5 and an upper cut-off frequency of 10Hz. If this Op-Amp is connected as an amplifier with a closed loop gain of 100, then the new upper cut-off frequency is
(a) 10Hz (b) 100Hz
(c) 10kHz (d) 100kHz

168. The voltage comparator can be used in A/D conversion as a
(a) 1-bit quantizer (b) 2-bit quantizer
(c) 4-bit quantizer (d) 8-bit quantizer

169. The main advantage of a successive approximation ADC is that
(a) it is independent of its chopper frequency (b) it has high series mode rejection
(c) it can operate faster than other ADCs (d) its conversion time can be varied

170. Which of the following terms is not associated with a S/H circuit?
(a) conversion time (b) acquisition time
(c) aperture time (d) sample time

171. The number comparators needed in parallel conversion type 8-bit ADC is
(a) 8 (b) 16
(c) 255 (d) 256

172. IEEE488 standard is based on the transmission of
(a) 4 bit (b) 8 bit
(c) 16 bit (d) 24 Bit

173. A digital voltmeter has a readout range from 0 to 999 counts. If the full scale reading is 9.999V, the resolution is
(a) 1V (b) 10mV
(c) 1mV (d) 0.001mV

174. The household analog energy meter is
(a) indicating instrument (b) recording instrument
(c) integrating instrument (d) none of these

45. A general purpose diode is more likely to suffer avalanche breakdown rather than zener breakdown because
(a) its leakage current is small (b) it has strong co-valent bond
(c) it is lightly doped (d) it has low reverse resistance

46. The turn on voltage of a Ge junction diode is
(a) 0.1 V (b) 0.3 V
(c) 0.7V (d) 1.0 V

47. Zener diode is always used with
(a) forward bias (b) reverse bias
(c) no bias (d) all of the above

48. The junction capacitance of a varactor diode is 5pf with a reverse voltage of 4V. If this bias is increased to 16V then the capacitance would become
(a) 20pf (b) 10pf
(c) 2.5pf (d) 1.25pf

49. The peak inverse voltage is applied across a diode when it is
(a) on (b) on a heat sink
(c) reverse biased (d) forward biased

50. When bias is applied to a varicap diode is increased, its capacitance
(a) decreases (b) increases
(c) remains constant (d) increases than decreases

51. The temperature co-efficient of resistance of a semiconductor is
(a) +ve (b) –ve
(c) zero (d) very high

52. In an unbiased P-N junction, thickness of depletion layer is of the order of
(a) 0.005μm (b) 0.5 μm
(c) 5 μm (d) 1nm

53. JFET can operate in
(a) depletion mode and enhancement mode
(b) depletion mode only
(c) enhancement mode only
(d) neither enhancement nor depletion mode

54. FETs have similar properties to
(a) PNP transistors (b) NPN transistors
(c) thermionic valve (d) UJTs

55. Which statement about MOSFET is false? MOSFETs can operate in
(a) depletion mode (b) enhancement mode
(c) both depletion & enhancement mode (d) depletion only mode

56. In a JFET, point of reference is
(a) drain (b) source
(c) gate (d) none of these

57. Input gate current of a FET is
(a) a few microampere (b) negligibly small
(c) a few milliamperes (d) a few amperes

58. For enhancement only mode N-channel MOSFET polarity of V_{gs} is
(a) –ve (b) +ve
(c) zero (d) variable

59. In a JFET operating above pinch-off voltage, the
(a) drain current increases steeply (b) drain current remains constant
(c) drain current starts decreasing (d) depletion region become smaller

60. The best electronic device for fast switching is
(a) BJT (b) triac
(c) JFET (d) MOSFET

61. Which semiconductor device acts like a diode and two resistors?
(a) SCR (b) triac
(c) diac (d) UJT

62. Which semiconductor device behaves like two SCRs?
(a) UJT (b) triac
(c) JFET (d) MOSFET

63. After firing an SCR, the gating pulse is removed. Then the current in the SCR will
(a) remain same (b) fall to zero
(c) rise up (d) rise a little then fall to zero

64. The oscillator circuit that uses a tapped coil in the tuned circuit is
(a) Multivibrator (b) Hartley
(c) Colpits (d) Armstrong

65. An oscillator produces oscillations due to which type of feedback?
(a) +ve feedback (b) –ve feedback
(c) Both +ve & –ve (d) neither +ve nor –ve

66. Frequency stability in an oscillator can be achieved by
(a) adjusting the phase shift (b) controlling its gain
(c) incorporating a tuned circuit (d) employing automatic biasing

67. An oscillator that consists of two interdependent circuits such that output of each controls the input of the other is called a
(a) sine wave oscillator (b) feedback oscillator
(c) relaxation oscillator (d) –ve resistance oscillator

154. To reduce the effect of noise level, 100 sets of data are arranged. The arranged data set will have a noise level reduced by a factor of
(a) 10 (b) $10\sqrt{2}$
(c) $50\sqrt{2}$ (d) 100

155. In a flux meter, the controlling torque is
(a) produced by weight attached to the moving coil
(b) produced by spring
(c) provided by cross coil mechanism
(e) not provided by all

156. Moving coil galvanometer is made into a dc ammeter by connecting
(a) a low resistance in series with the meter (b) a high resistance in series with the meter
(c) a pure inductance across the meter (d) a capacitor in series with the meter

157. The effect of stray magnetic fields on the actuating torque of a portable instrument is maximum, when the operative field of the instrument and stray fields are
(a) perpendicular (b) parallel
(c) inclined at 60º (d) none of these

158. A current i = 10(1+sint) amperes is passed through an ideal moving iron type ammeter. Its reading will be
(a) zero (b) 10 A
(c) $\sqrt{150}$ A (d) $\sqrt{2}$ A

159. For a given frequency the deflecting torque of an induction ammeter is directly proportional to
(a) current^2 (b) current^3
(c) $\sqrt{\text{current}}$ (d) current

160. The sensitivity of a Wheatstone bridge depends upon
(a) galvanometer current sensitivity (b) galvanometer resistance
(c) bridge supply voltage (d) all of the above

161. The resistance of a shunt for a precision grade ammeter can be best measured by
(a) Wheatstone bridge (b) Schering bridge
(c) Maxwell bridge (d) Kelvin double bridge

162. A dc potentiometer is designed to measure up to about 2V with a slide wire of 800mm. A standard cell of emf 1.18V obtains balance at 600mm. A test cell is seen to obtain balance at 680mm. The emf of the test cell is
(a) 1.00V (b) 1.34V
(c) 1.5V (d) 1.7V

163. Hay's bridge is suitable for self inductance measurement of a coil having Q factor
(a) > 10 (b) < 10
(c) > 1 (d) < 1

143. If the transconductance of MOSFET is 10 mmho and its drain resistance is 3KΩ, its voltage gain is
(a) 0.3 (b) 3
(c) 3.3 (d) 30

144. g_m of MOSFET is controlled by
(a) gate-source voltage (b) drain- source voltage
(c) drain current (d) gate current

145. MOSFET is used for
(a) regulator control (b) maintaining constant voltage
(c) automatic gain control (d) low input impedance

146. SCR can be used in
(a) oscillator (b) regulator
(c) amplifier (d) light dimming

147. The drain resistance of JFET is
(a) $1/ g_m$ (b) μ / g_m
(c) g_m / μ (d) μg_m

148. For 1 Volt emitter bias what is R_E if I_E = 300mA
(a) 1Ω (b) 3.33Ω
(c) 6.667Ω (d) 33.3Ω

149. Torque/weight ratio of an instrument indicates
(a) selectivity (b) accuracy
(c) sensitivity (d) fidelity

150. The first order instrument is characterized by
(a) time constant only
(b) static sensitivity and time constant
(c) static sensitivity and damping co-efficient
(d) static sensitivity and natural frequency of oscillations

151. Which one of the following decides the time of response of an indicating instrument?
(a) deflecting system (b) controlling system
(c) damping system (d) pivot and jewel system

152. The difference between the indicated value and the true value of a quantity is
(a) gross error (b) absolute error
(c) dynamic error (d) relative error

153. A wattmeter has a range of 1000W with an error of ±1% of full scale deflection, If the true power passed through it is 100W, the relative error would be
(a) ±10% (b) ±5%
(c) ±1% (d) ±0.5%

68. The Wien bridge oscillator is
(a) a free running oscillator (b) a square wave generator
(c) a stable sine wave generator (d) also called cosine oscillator

69. If the frequency of incoming rectangular wave in a staircase generator is 100Hz, the number of steps in the output staircase pattern is
(a) 100 (b) 200
(c) 300 (d) 500

70. Resistance of an accurate ammeter is
(a) high (b) low
(c) very low (d) very high

71. The duty cycle of a pulse of width 2 microsecond and repetition frequency 4kHz is
(a) 0.5 (b) 0.06
(c) 0.008 (d) 0.8

72. Deflection sensitivity of a CRO is
(a) directly proportional to
(b) inversely proportional to
(c) does not depend on distance between the deflecting plate and screen
(d) none of these

73. Noise figure of a two stage amplifier depends on the gain of
(a) first stage (b) second stage
(c) both the stages (d) none of the stages

74. Wien bridge is usually used for measuring
(a) resistance (b) capacitance
(c) frequency (d) current

75. The Kelvin double bridge is used for measuring accurately
(a) low value resistors (b) high value resistors
(c) any resistors (d) inductors

76. Under identical values of cold and hot junction temperatures, which thermocouple gives the highest output?
(a) iron constantan (b) nickel iron
(c) chromal constantan (d) platinum rhodium

77. A delay line is used in high speed CRO to introduce time delay in
(a) vertical channel (b) horizontal channel
(c) z axis of the CRT (d) all of the above

78. For dc voltage an inductor behaves like a
(a) short circuit (b) open circuit
(c) depends on polarity (d) depends on voltage

79. A connected planar network has 4 nodes and 5 elements. The number of meshes in its dual network is
(a) 4 (b) 3
(c) 2 (d) 1

80. If there are b branches and n nodes in a network, then the number of independent KVL equations will be
(a) b (b) b–n
(c) n–1 (d) b–n+1

81. In a linear network containing only independent current sources and resistors, if the values of all the current sources are doubled then the values of node voltages will be
(a) doubled (b) halved
(c) same (d) none of these

82. Which of the following theorem is a manifestation of the law of conservation of energy?
(a) Thevenin's theorem (b) Telegan's theorem
(c) Reciprocity theorem (d) compensation theorem

83. When a source is delivering maximum power to a load, the efficiency of the circuit
(a) is always 50% (b) is always 75%
(c) depends on the (d) none of these parameters

84. Twelve 1Ω resistances are used as edges to form a cube. The resistance between two diagonally opposite corners of the cube is
(a) 6/5Ω (b) 1Ω
(c) 5/6Ω (d) 6Ω

85. The ratio of active power to apparent power is known as
(a) power factor (b) load factor
(c) form factor (d) demand factor

86. The transient current in an RLC circuit is oscillating when
(a) $R = 2\sqrt{(L/C)}$ (b) $R>2\sqrt{(L/C)}$
(c) $R< 2\sqrt{(L/C)}$ (d) $R = 0$

87. A coil with a certain number of turns has a specified time constant. If the no. of turns is doubled, the time constant will be
(a) halved (b) doubled
(c) become four fold (d) unaffected

88. An R-L-C series circuit has R=1Ω, L=1H, and C=1F. Damping ratio of the circuit will be
(a) >1 (b) unity
(c) 0.5 (d) zero

89. A series R-L circuit with R=100Ω, L=50H is connected to a dc source of 100V. The time taken for the current to rise to 70% of its steady value is
(a) 0.2s (b) 0.6s
(c) 2.4s (d) none of these

131. In active region of common base transistor
(a) B-E junction is forward biased (b) B-E junction is reverse biased
(c) C-B junction is forward biased (d) both junctions are reverse biased

132. The maximum power dissipated by a diode is
(a) V_DI_D (b) V_rI_r
(c) $V_DI_D + V_rI_r$ (d) zero

133. In which of the following device reverse recovery time is nearly zero?
(a) diode (b) tunnel diode
(c) Schottky diode (d) PIN diode

134. Two similar mutually coupled coils have a total inductance of 900mH and co-efficient of coupling is 0.5. The self inductance of each coil is
(a) 300mH (b) 150mH
(c) 75mH (d) 50mH

135. Common collector transistor configuration is used for
(a) voltage amplification (b) current amplification
(c) impedance matching (d) rectification

136. Stability factor S of a self bias circuit depends on
(a) β alone (b) β, R_b and R_e
(c) β, R_b and R_c (d) R_b and R_c

137. Hybrid parameters equivalent for BJT is valid at
(a) low frequency (b) HF
(c) VHF (d) UHF

138. Voltage gain of BJT amplifier is
(a) A_IR_L (b) $A_I (R_i/R_L)$
(c) $A (R_L/R_i)$ (d) none of these

139. The relation between I_D and V_{GS} in FET is
(a) $I_D = I_{DSS} (1 - V_{GS}/ V_P)$ (b) $I_D = I_{DSS} (1 - V_{GS}/ V_P)^2$
(c) $I_D = I_{DSS} (V_{GS}/ V_P)$ (d) $I_D = I_{DSS} (1 - V_P/ V_{GS})$

140. If $V_P = 5V$, the maximum drain current, the dc resistance is
(a) 25Ω (b) 25KΩ
(c) 250Ω (d) 250KΩ

141. The pinch off voltage is
(a) V_{DS} (max) of flat drain curve (b) V_{DS} (min) of flat drain curve
(c) V_{DS} at $V_{GS} = 0V$ (d) V_{DS} at $V_{GS} < 0V$

142. If $I_{DSS} = 7mA$, V_{GS} (off) = 3V and $V_{GS} = – 1V$ then the drain current is
(a) 31.2mA (b) 312mA
(c) 3.11mA (d) 0.312mA

119. The reverse saturation current of a silicon diode doubles for every
(a) 10ºK rise in temperature (b) 10ºC rise in temperature
(c) 2ºC rise in temperature (d) 10ºF rise in temperature

120. If the current in a diode is 10mA at forward bias voltage of 0.1V, the static resistance is
(a) 10Ω (b) 100Ω
(c) 1kΩ (d) 0.01Ω

121. For low frequency operated diode, the effects of diffusion capacitance is
(a) negligible (b) high
(c) more than transition capacitance (d) less than transition capacitance

122. A.C. resistance of a diode means
(a) static resistance (b) dynamic resistance
(c) it does not change with V-I characteristic (d) constant resistance

123. In the break down region of a zener diode
(a) current is zero (b) current is very high
(c) voltage is zero (d) current is very small

124. Power diode are used with
(a) heat sinks (b) reverse bias
(c) forward bias (d) at room temperature

125. Tunnel diode is used in
(a) oscillators (b) amplifiers
(c) regulators (d) switching circuits

126. An a.c. regulator can be designed with
(a) two diodes (b) two tunnel diodes
(c) two zener diodes (d) none of these

127. The diodes are used in series to
(a) increase current carrying capacity (b) increase PIV
(c) reduce PIV (d) reduce resistance

128. If $I_D = 10mA$ at $V_D = 1V$ at a point of operation, then maximum power dissipation is
(a) 1.0mW (b) 1.0 W
(c) 0.1mW (d) 10mW

129. In bridge rectifier PIV of each diode needs to be
(a) $4V_m$ (b) $2V_m$
(c) V_m (d) $V_m/4$

130. In half wave rectifier, if V_i to the diode is 20sin(wt), V_{dc} is
(a) 6.37V (b) 10V
(c) 14.2V (d) 20V

90. The steady state current in the R-C series circuit on the application of a step voltage of magnitude E will be
(a) zero (b) E/R
(c) $(E/R)\, e^{-t/RC}$ (d) $(E/RC)\, e^{-t}$

91. When an unit impulse voltage is applied to an inductor of 1H, the energy supplied by the source is
(a) ∞ (b) 1 Joule
(c) 0.5 Joule (d) zero

92. An initially relaxed R-C series network with R=2MΩ and C=1μF is switched on to a 10V step input. The voltage across the capacitor after 2sec will be
(a) zero (b) 3.68V
(c) 6.32V (d) 10V

93. The Laplace transform of the function $i(t)$ is given as

$$I(s) = \frac{10S + 4}{S(S+1)(S^2 + 4S + 5)}$$

Final value of i will be
(a) 4/5 (b) 5/4
(c) 4 (d) 5

94. A network has seven nodes and five independent loops. The number of branches in the network is
(a) 5 (b) 7
(c) 11 (d) 13

95. If all the elements in a particular network are linear then the superposition theorem holds, when the excitation is
(a) dc (b) ac
(c) dc or ac (d) impulse

96. Two coils having equal resistances but different inductances are connected in series. The time constant of the series combination is the
(a) sum of the time constants of the individual coils
(b) average of the time constants of the individual coils
(c) geometric mean of the time constants of the individual coils.
(e) Product of the time constants of the individual coils.

97. The dc gain of a system represented by the transfer function

$$\frac{V_0}{V_i} = \frac{25}{(S+2)(S+3)}$$ is
(a) 25 (b) 25/6
(c) 5 (d) 10

98. Which of the following pair is correctly matched?
(a) symmetrical two port network : AD – BC = 1
(b) reciprocal two port network : $Z_{11} = Z_{22}$
(c) inverse hybrid parameters : A, B, C, D
(e) hybrid parameters : $(V_1 , I_2) = f(I_1, V_2)$

99. For a two port network to be reciprocal, it is necessary that
(a) $Z_{11} = Z_{22}$ and $Y_{12} = Y_{21}$
(b) $Z_{11} = Z_{22}$ and AD – BC = 0
(c) $h_{21} = – h_{12}$ and AD – BC = 0
(e) $Y_{12} = Y_{21}$ and $h_{21} = – h_{12}$

100. With usual notation a two port resistive network satisfied the condition
A = D = (3/2)B = (4/3)C
The Z_{11} of the network is
(a) (5/3)Ω (b) (4/3)Ω
(c) (2/3)Ω (d) (1/3)Ω

101. A two port network is defined by the relations
$I_1 = 2V_1 + V_2$, $I_2 = 2V_1 + 3V_2$ then
(a) – 2 Ω (b) – 1 Ω
(c) – (½)Ω (d) – (1/4)Ω

102. A system has a single pole. The constant multiplier 'k' is 1. For the given excitation sin(t), the response is √2 with 45º lagging. The system has a pole and a zero respectively at
(a) zero and 1 (b) ∞ and – 1
(c) – 1 and zero (d) zero and – 1

103. The frequency at which two asymptotes meets is known as
(a) corner or break frequency (b) threshold frequency
(c) cut off frequency (d) critical frequency

104. The network function $F(S)=\frac{(S+2)}{(S+1)(S+3)}$ represents an
(a) RC impedance (b) RL impedance
(c) RC impedance and an RL admittance (d) RC admittance and RL impedance

105. In case of RC driving point function
(a) Z_{RC} cannot have a pole at infinity
(b) Z_{RC} cannot have a pole at origin
(c) Y_{RC} cannot have a pole at infinity
(d) Z_{RC} and Y_{RC} are constant or zero at infinity

106. A Hurwitz polynomial has
(a) zeros only in the left half plane (b) poles only in the left half plane
(c) zeros anywhere in the S Plane (d) poles on the jw axis only

107. If (wL << R) and (wC << G) of a transmission line, the attenuation constant γ is
(a) proportional to frequency (b) inversely proportional to frequency
(c) independent of frequency (d) none of these

108. The distortionless condition of a transmission line is given by
(a) $Z_0 = \sqrt{(L/C)}$ (b) RG = LC
(c) R/G = L/C (d) none of these

109. If k = 0 in a transmission line, the VSWR is given by
(a) 2 (b) 1
(c) 3 (d) ∞

110. For the short circuit load, the voltage minimum occurs at
(a) source point (b) load point
(c) between source and load (d) none of these

111. In insulators
(a) EM waves propagate (b) current flows
(c) electrostatic energy is stored (d) magnetic energy is stored

112. The Hall co-efficient has the unit of
(a) c/m^3 (b) m^3/c
(c) c^3/m (d) c/m

113. Forbidden gap in a semiconductor is
(a) large (b) very large
(c) small (d) not present

114. Diode is used as
(a) current source (b) voltage source
(c) amplifier (d) rectifier

115. For the lower Q-point operation of a diode ac resistance is
(a) high (b) low
(c) very low (d) reduced

116. The reverse saturation current of a diode means
(a) the current under reverse bias (b) saturated current in forward bias
(c) highest current (d) current for full load

117. At room temperature, the thermal voltage in a diode is
(a) 26V (b) 26mV
(c) 2.6V (d) 2.6mV

118. The knee voltage of GaAs is
(a) 0.3V (b) 0.7V
(c) 1.2V (d) 2.3V