

- 3139 _____electric shock current through the body will creat muscles contraction and breathing problem.
- below 10 mA
 - 10 mA to 15 mA
 - 15 mA to 20 mA
 - 20 mA to 40 mA
- 3140 _____electric shock current through the body will only create muscles contraction.
- below 10 mA
 - 10 mA to 15 mA
 - 15 mA to 20 mA
 - 20 mA to 40 mA
- 3141 _____Shock current will cause rapid, uncoordinated series of contractions of heart muscles causing an irregular heartbeat (fibrillation) and possible death.
- 10 - 20 mA
 - 20 - 40 mA
 - 40 - 80 mA
 - > 100 mA
- 3142 Which of the following will cause if above 100 mA electric shock current flow through the body?
- Burns & Muscles contractions
 - stoppage of heart
 - Death
 - All of these
- 3143 Which of the following should you NOT do if a person is in contact with a source of electricity and suffering from electrical shock?
- Call 108
 - If safe, turn off the power or source of electricity
 - Touch him or her directly with your body
 - Use a safe object to move the source of electricity
- 3144 When moving a source of electricity away from a victim of electrical shock, you can use an object made of which of the following materials?
- Cardboard
 - Plastic
 - Wood
 - All of these
- 3145 Current flow from hand to hand is called_____.
- Amperage
 - Step potential
 - Touch potential
 - None of these
- 3146 Which of the following will be affected by Electrical shock?
- tissue
 - muscle
 - internal organs
 - All of these
- 3147 The size of the earth or ground wire is based on the _____.
- maximum fault current carrying through the ground wire
 - the rated current carrying capacity of the service line
 - depends on the soil resistance
 - both (a) and (c)
- 3148 Earth wire or ground wire is made of_____.
- copper
 - aluminium
 - iron
 - galvanized steel
- 3149 Generally grounding is provided for_____.
- only for the safety of the equipment
 - only for the safety of the operating personnel
 - for the safety of the equipment and operating personnel
 - none of these
- 3150 When earth fault occurs_____.
- voltage potential at the earth mat increases due to grounding
 - voltage potential at the earth mat decreases due to grounding
 - voltage potential at the earth mat remains zero irrespective of fault
 - none of the above

- 3151 The objective of earthing or grounding is_____.
- to provide as low resistance possible to the ground
 - to provide as high resistance possible to the ground
 - to provide a flow of positive, negative and zero sequence currents
 - All of these
- 3152 Moisture content in the soil _____the earth soil resistance
- increase
 - decrease
 - does not affect
 - none of the above
- 3153 Factors on which soil resistance depends is_____.
- depth of the electrode
 - moisture
 - NaCl
 - All of these
- 3154 The ground resistance should be designed such that_____.
- as low as possible
 - as high as possible
 - between -1 to -10 ohms
 - between 5 - 10 ohms
- 3155 For maintenance of an EHV equipment , first it should be isolated and connected to ground because_____.
- to provide low impedance
 - to discharge the charging capacitance to ground
 - protection for operating personnel
 - to discharge the charging capacitance to ground and protection for operating personnel
- 3156 The advantage of neutral earthing is_____.
- Freedom from persistent arcing grounds
 - Over voltages due to lightning can be discharged to earth
 - Simplified design earth fault protection
 - All of the these
- 3157 In a star connected system without neutral grounding, zero sequence currents are_____.
- Zero
 - Phaser sum of phase currents
 - Same as r.m.s. value of phase currents
 - Same as peak value of phase currents
- 3158 The advantage of neutral earthing
- Safety of personnel
 - Reduction of earth fault current
 - Elimination of arcing ground
 - None of these
- 3159 What do we connect with earth during earthing or grounding of the electrical system?
- connecting frame of electrical equipment (non-current carrying part)
 - neutral point in a star-connected system
 - one conductor of the secondary of a transformer
 - all of these
- 3160 Which of the following are the types of Grounding or earthing?
- Equipment grounding
 - System grounding
 - Equipment grounding and System grounding
 - none of these
- 3161 The process of connecting non-current-carrying metal parts (i.e. metallic enclosure) of the electrical equipment to earth (i.e. soil) in such a way that in case of insulation failure, the enclosure effectively remains at earth potential is called _____.
- Equipment grounding
 - System grounding
 - Neutral grounding

- d. Shielding
- 3162 The process of connecting some electrical part of the power system (e.g. neutral point of a star connected system, one conductor of the secondary of a transformer etc.) to earth (i.e. soil) is called _____.
- Equipment grounding
 - System grounding
 - Neutral grounding
 - Shielding
- 3163 _____ is known as connecting the metallic parts of different machines which is not considered to be carrying electric current during normal operation of the machines to bring them at the same level of electric potential.
- Equipment grounding
 - System grounding
 - Neutral grounding
 - Bonding
- 3164 Which of the following are the Types of Earthing?
- Plate earthing
 - Pipe earthing
 - Strip or Wire earthing
 - All of these
- 3165 What is the specification of GI earth plate?
- 600 mm * 600 mm * 3 mm
 - 600 mm * 600 mm * 4 mm
 - 600 mm * 600 mm * 5 mm
 - 600 mm * 600 mm * 6 mm
- 3166 What is the amount of charcoal and salt needed for GI Pipe earthing?
- Charcoal 5 kg, salt 8 kg
 - Charcoal 10 kg, salt 8 kg
 - Charcoal 10 kg, salt 10 kg
 - Charcoal 5 kg, salt 5 kg
- 3167 What type of earthing is used by transmission lines?
- Plate earthing
 - Rod earthing
 - Strip earthing
- d. All of these
- 3168 Which type of earthing is also called as 'fire earthing'?
- Plate earthing
 - Rod earthing
 - Strip earthing
 - All of these
- 3169 The size of the earth or ground wire is based on the
- maximum fault current carrying through the ground wire
 - rated current carrying capacity of the service line
 - depends on the soil resistance
 - both (a) and (b)
- 3170 Which colour wire is recommended for earth connection as per ISI code?
- Red
 - Green
 - Black
 - Blue
- 3171 What are the Factors of the ground electrode affecting Earth Resistance?
- Depth and Diameter
 - Nos of Electrode
 - Grounding system design
 - All of these
- 3172 Which of the following is/are the type of grounding system design?
- Ground Plate
 - Multiple ground electrode
 - Mat network
 - All of these
- 3173 Which of the following is/are the methods for grounding the neutral point of a 3-phase system are
- Solid or effective grounding
 - Resistance or Reactance grounding
 - Peterson-coil grounding
 - All of these
- 3174 On which of the following factors does the resistivity of a material depend?
- Resistance of the conductor

- b. Area of the conductor section
c. Length of the conductor
d. All of the above
- 3175 Piezoelectric materials serve as a source of_____.
- a. Resonant waves
b. Musical waves
c. Microwaves
d. Ultrasonic waves
- 3176 The tiny block formed by the arrangement of a small group of atoms is called the_____.
- a. Unit cell
b. Space lattice
c. Either (a) or (b)
d. None of the above
- 3177 The number of atoms per unit cell in structure is_____.
- a. 1
b. 2
c. 4
d. 8
- 3178 Which of the following variety of copper has the best conductivity?
- a. Induction hardened copper
b. Hard drawn copper
c. Pure annealed copper
d. Copper containing traces of silicon
- 3179 The kinetic energy of a bounded electron is_____.
- a. Less than that of unbounded electron
b. Greater than that of unbounded electron
c. Equal to that of unbounded electron
d. Infinite
- 3180 Super conductivity can be destroyed by_____.
- a. Adding impurities
b. Reducing temperatures
c. Application of magnetic field
d. Any of the above
- 3181 The conductivity of a conductor can be increased by_____.
- a. Decreasing its temperature
- b. Increasing its temperature
c. Decreasing its vibration
d. Increasing its vibration
- 3182 Mercury as an electric contact material is_____.
- a. A liquid
b. A metal
c. A metal liquid
d. A gas
- 3183 _____has the best damping properties.
- a. Diamond
b. High speed steel
c. Mild steel
d. Cast iron
- 3184 The conductors have transport phenomena of electrons due to_____.
- a. Electric field
b. Magnetic field
c. Electromagnetic field
d. None of the above
- 3185 _____is a negatively charged particle present in an atom.
- a. Proton
b. Neutron
c. Electron
d. None of the above
- 3186 The resistivity of a metal is a function of temperature because_____.
- a. The amplitude of vibration of the atoms varies with temperature
b. The electron density varies with temperature
c. The electron gas density varies with temperature
d. None of the above
- 3187 _____is a hard solder.
- a. Tin-lead
b. Tin-silver-lead
c. Copper-zinc
d. None of the above
- 3188 Selenium is _____semiconductor.
- a. Extrinsic

- b. Intrinsic
c. N-type
d. P-type
- 3189 The structure sensitive property of a super conductor is_____.
- a. Critical magnetic field
b. Transition temperature
c. Critical current density
d. None of the above
- 3190 Spark plug makes use of which of the following materials for insulation?
- a. Porcelain
b. Slate
c. Asbestos
d. Glass
- 3191 An H.R.C. fuses is_____.
- a. A ceramic body having metal and caps
b. A wire of platinum
c. A heavy cross-section of copper or aluminium
d. A ceramic tube having carbon rod inside it
- 3192 Which of the following materials is used for making coils of standard resistances?
- a. Copper
b. Nichrome
c. Platinum
d. Manganin
- 3193 The minority carrier concentration is largely a function of_____.
- a. Forward biasing voltage
b. Reverse biasing voltage
c. Temperature
d. The amount of doping
- 3194 High resistivity materials are used in_____.
- a. Precision instruments
b. Heating elements
c. Motor starters
d. Incandescent lamps
e. All of the above
- 3195 Low resistivity materials are used in_____.
- a. Transformer, motor and generator windings
b. Transmission and distribution lines
c. House wiring
d. All above applications
- 3196 Most of the common metals have _____structure.
- a. Linear
b. Hexagonal
c. Orthorhombic
d. Cubic
- 3197 Which of the following materials does not have covalent bonds?
- a. Organic polymers
b. Silicon
c. Metals
d. Diamond
- 3198 For germanium the forbidden energy gap is
- a. 0.15 eV
b. 0.25 eV
c. 0.5eV
d. 0.7eV
- 3199 Thermionic emission occurs in_____.
- a. Vacuum tubes
b. Copper conductors
c. Ferrite cores
d. Transistors
- 3200 Copper, even though costly, finds use in the windings of electrical machines because_____.
- a. Copper points offer low contact resistance
b. Copper can be easily soldered and welded
c. Copper windings are less bulky and the machines become compact
d. All of the above
- 3201 _____has zero temperature co-efficient of resistance.
- a. Aluminium
b. Carbon
c. Porcelain
d. Manganin

- 3202 Which of the following is a semiconductor material?
- Phosphorous
 - Rubber
 - Silicon
 - Aluminium
- 3203 Constantan contains_____.
- Silver and tin
 - Copper and tungsten
 - Tungsten and silver
 - Copper and nickel
- 3204 _____is the main constituent of glass.
- Fe_2O_3
 - SiO_2
 - Al_2O_3
 - B_2O_3
- 3205 In a superconductor the value of critical density depends upon_____.
- Magnetic field strength
 - Temperature
 - Either (a) or (b)
 - Both (a) and (b)
- 3206 The co-ordination number of a simple cubic structure is_____.
- 2
 - 4
 - 6
 - 8
- 3207 The conduction of electricity, in semiconductors, takes place due to movement of_____.
- Positive ions only
 - Negative ions only
 - Positive and negative ions
 - Electrons and holes
- 3208 In conductors conduction of electricity takes place due to movement of_____.
- Electrons only
 - Positive ions only
 - Negative ions only
 - Positive and negative ions
- 3209 A highly conductive material must have_____.
- Highest conductivity
 - Lowest temperature co-efficient
 - Good mechanical strength
 - Good corrosion resistance
 - All of the above
- 3210 Is an element used in semiconductors whose atoms have three valence electrons?
- An acceptor
 - A donor
 - Germanium
 - Silicon
- 3211 The coils of motor starter are wound with wire of_____.
- Copper
 - Kanthal
 - Manganin
 - Nichrome
- 3212 Due to which of the following factors the brush wear rate is altered?
- Speed of the machine
 - Contact pressure
 - Surface conditions of brush and commutator
 - All of the above
- 3213 Which of the following affect greatly the resistivity of electrical conductors?
- Composition
 - Pressure
 - Size
 - Temperature
- 3214 Carbon resistors are used extensively because they are_____.
- Easy to make
 - Compact
 - Inexpensive
 - All of the above reasons
- 3215 The current due to electron flow in conduction band is_____the hole current in valence band.
- Equal to

- b. Less than
c. Greater than
d. Any of the above
- 3216 The metal having the lowest temperature coefficient of resistance is_____.
- a. Gold
b. Copper
c. Aluminium
d. Kanthal
- 3217 A perfect conductor has_____.
- a. Zero conductivity
b. Unity conductivity
c. Infinite conductivity
d. None of the above
- 3218 For a particular material the Hall coefficient was found to be zero. The material is_____.
- a. Insulator
b. Metal
c. Intrinsic semiconductor
d. None of the above
- 3219 Total number of crystal systems is_____.
- a. 2
b. 4
c. 7
d. 12
- 3220 Superconductors are becoming popular for use in_____.
- a. Generating very strong magnetic field
b. Manufacture of bubble memories
c. Generating electrostatic field
d. Generating regions free from magnetic field
- 3221 In graphite, bonding is_____.
- a. Covalent
b. Metallic
c. Vander Waals
d. Vander Waals and covalent
- 3222 The converse of hardness is known as_____.
- a. Malleability
b. Toughness
- c. Softness
d. None of the above
- 3223 Which of the following resistive materials has the lowest temperature co-efficient of resistance?
- a. Nichrome
b. Constantan
c. Kanthal
d. Molybdenum
- 3224 The value of critical field below the transition temperature will_____.
- a. Increase
b. Decrease
c. Remain unchanged
d. Any of the above
- 3225 _____is viscoelastic.
- a. Cast-iron
b. Graphite
c. Rubber
d. Glass
- 3226 Which of the following factors affect resistivity of metals?
- a. Age hardening
b. Alloying
c. Temperature
d. Cold work
e. All of the above
- 3227 By increasing impurity content in the metal alloy the residual resistivity always_____.
- a. Decreases
b. Increases
c. Remains constant
d. Becomes temperature independent
- 3228 Carbon bearings are used under which of the following conditions?
- a. Where lubrication is difficult or impossible
b. Where corrosive chemical action exists
c. Where high temperature exists
d. All of the above
- 3229 For a hole which of the following statements is incorrect?

- a. Holes can exist in certain semiconductors only
 b. Holes can exist in any material including conductors
 c. Holes may constitute an electric current
 d. Holes can be considered as a net positive charge
- 3230 Substances whose specific resistance abruptly decreases at very low temperature are called
 a. Insulators
 b. Conductors
 c. Semiconductors
 d. Superconductors
- 3231 The impurity atoms in semiconductors_____.
 a. Inject more charge carriers
 b. Reduce the energy gap
 c. Increase the kinetic energy of valence electrons
 d. All of the above
- 3232 The photo-electric effect occurs only when the incident light has more than a certain critical _____.
 a. Intensity
 b. Speed
 c. Frequency
 d. Wave length
- 3233 Carbon rods are used in wet and dry cells because_____.
 a. Carbon rod serves as conductor
 b. Carbon can resist the attack of battery acid
 c. Both (a) and (b)
 d. Either (a) or (b)
- 3234 The superconductivity is due to_____.
 a. The crystal structure having no atomic vibration at 0°K
 b. All electrons interact in the superconducting state
 c. The electrons jump into nucleus at 0°K
 d. None of the above
- 3235 Overhead telephone wires are made of
 a. aluminium
 b. steel
 c. ACSR conductors
 d. Copper
- 3236 _____ is most commonly used for making magnetic recording tape
 a. Silver nitrate
 b. Ferric oxide
 c. Small particles of iron
 d. Silicon-iron
- 3237 A good electric contact material should have all of the following properties except_____.
 a. High resistivity
 b. High resistance to corrosion
 c. Good thermal conductivity
 d. High melting point
- 3238 Non-linear resistors_____.
 a. Produce harmonic distortion
 b. Follows Ohm's law at low temperatures only
 c. Result in non-uniform heating
 d. None of the above
- 3239 The covalent bond is formed by_____.
 a. Transfer of electrons between atoms
 b. Sharing of electrons between atoms
 c. Sharing of variable number of electrons by a variable number of atoms
 d. None of the above
- 3240 The formula _____ determines the number of electrons that can be accommodated in any level.
 a. $2n^2$
 b. $4n^2$
 c. $2n^3$
 d. $4n^3$
- 3241 Carbon electrodes are not used in
 a. GLS lamps
 b. Electric arc furnace
 c. Dry cells

- d. Cinema projectors
- 3242 At transition temperature the value of critical field is_____.
- a. Zero
 - b. Negative real value
 - c. Positive real value
 - d. Complex value

- 3243 Buzzer in principle is a bell
- a. with hammer
 - b. with gong
 - c. with both hammer and gong
 - d. without hammer and gong

PART-I(B)

ANSWER KEYS FOR

ELECTRICAL

SUPERVISOR CERTIFICATE OF COMPETENCY (SCC)-

MV

AND

CHARTERED ELECTRICAL SAFETY ENGINEER (CESE)-

UPTO 440V

1.	d	49.	b	97.	d	145.	c	192.	b	240.	c	288.	a	336.	c
2.	b	50.	b	98.	a	146.	c	193.	b	241.	a	289.	c	337.	d
3.	d	51.	b	99.	c	147.	c	194.	b	242.	b	290.	d	338.	a
4.	b	52.	b	100.	a	148.	a	195.	a	243.	a	291.	a	339.	d
5.	b	53.	c	101.	d	149.	b	196.	d	244.	c	292.	a	340.	b
6.	d	54.	a	102.	d	150.	c	197.	d	245.	d	293.	c	341.	c
7.	b	55.	a	103.	b	151.	c	198.	c	246.	c	294.	b	342.	d
8.	b	56.	a	104.	b	152.	a	199.	c	247.	d	295.	c	343.	c
9.	d	57.	d	105.	a	153.	a	200.	a	248.	d	296.	c	344.	d
10.	c	58.	c	106.	a	154.	c	201.	d	249.	d	297.	b	345.	d
11.	b	59.	d	107.	a	155.	d	202.	a	250.	d	298.	a	346.	c
12.	d	60.	c	108.	d	156.	c	203.	a	251.	c	299.	c	347.	c
13.	d	61.	c	109.	b	157.	d	204.	b	252.	d	300.	b	348.	b
14.	b	62.	c	110.	d	158.	a	205.	b	253.	b	301.	d	349.	a
15.	c	63.	b	111.	a	159.	c	206.	c	254.	d	302.	d	350.	b
16.	c	64.	c	112.	d	160.	a	207.	b	255.	b	303.	b	351.	a
17.	d	65.	b	113.	c	161.	b	208.	d	256.	d	304.	c	352.	d
18.	d	66.	b	114.	a	162.	c	209.	d	257.	d	305.	d	353.	b
19.	c	67.	b	115.	d	163.	b	210.	a	258.	b	306.	d	354.	a
20.	c	68.	b	116.	c	164.	b	211.	a	259.	d	307.	d	355.	a
21.	c	69.	c	117.	b	165.	b	212.	a	260.	a	308.	d	356.	d
22.	b	70.	a	118.	d	166.	d	213.	c	261.	b	309.	d	357.	a
23.	d	71.	d	119.	a	167.	a	214.	c	262.	c	310.	d	358.	c
24.	b	72.	a	120.	b	168.	b	215.	a	263.	a	311.	c	359.	d
25.	b	73.	b	121.	c	169.	a	216.	c	264.	c	312.	d	360.	b
26.	b	74.	c	122.	a	170.	d	217.	b	265.	d	313.	c	361.	d
27.	c	75.	b	123.	b	171.	a	218.	a	266.	a	314.	a	362.	a
28.	c	76.	b	124.	a	172.	a	219.	d	267.	b	315.	a	363.	d
29.	b	77.	c	125.	c	173.	b	220.	d	268.	d	316.	c	364.	c
30.	c	78.	d	126.	b	174.	c	221.	d	269.	d	317.	a	365.	d
31.	c	79.	a	127.	a	175.	c	222.	c	270.	b	318.	d	366.	a
32.	d	80.	c	128.	d	176.	c	223.	a	271.	d	319.	d	367.	d
33.	c	81.	b	129.	a	177.	a	224.	c	272.	c	320.	b	368.	b
34.	c	82.	d	130.	d	178.	a	225.	d	273.	b	321.	d	369.	b
35.	c	83.	a	131.	c	179.	a	226.	c	274.	d	322.	c	370.	d
36.	a	84.	b	132.	c	180.	c	227.	a	275.	a	323.	d	371.	a
37.	b	85.	d	133.	b	181.	b	228.	d	276.	a	324.	d	372.	d
38.	b	86.	c	134.	a	182.	c	229.	d	277.	d	325.	b	373.	b
39.	a	87.	d	135.	a	183.	d	230.	a	278.	d	326.	d	374.	d
40.	c	88.	a	136.	c	184.	b	231.	c	279.	d	327.	c	375.	a
41.	a	89.	b	137.	c	185.	d	232.	c	280.	d	328.	d	376.	c
42.	d	90.	c	138.	a	186.	d	233.	c	281.	d	329.	d	377.	d
43.	a	91.	b	139.	c	187.	d	234.	b	282.	a	330.	c	378.	d
44.	b	92.	c	140.	c	188.	c	235.	d	283.	b	331.	b	379.	d
45.	a	93.	c	141.	d	189.	a	236.	d	284.	c	332.	d	380.	d
46.	b	94.	d	142.	d	190.	c	237.	c	285.	b	333.	a	381.	c
47.	a	95.	a	143.	a	191.	a	238.	c	286.	c	334.	d	382.	a
48.	d	96.	b	144.	d	192.	b	239.	b	287.	d	335.	b	383.	d

384.	d	432.	c	480.	b	528.	d	576.	c	624.	a	672.	a	720.	c
385.	d	433.	d	481.	b	529.	e	577.	b	625.	b	673.	d	721.	a
386.	c	434.	c	482.	b	530.	a	578.	e	626.	b	674.	b	722.	a
387.	b	435.	e	483.	a	531.	b	579.	b	627.	c	675.	c	723.	a
388.	a	436.	e	484.	a	532.	d	580.	c	628.	b	676.	a	724.	d
389.	c	437.	a	485.	c	533.	d	581.	a	629.	c	677.	d	725.	d
390.	b	438.	c	486.	b	534.	c	582.	b	630.	c	678.	c	726.	c
391.	d	439.	e	487.	a	535.	b	583.	a	631.	b	679.	b	727.	b
392.	a	440.	d	488.	c	536.	b	584.	b	632.	e	680.	c	728.	a
393.	d	441.	b	489.	b	537.	d	585.	b	633.	b	681.	c	729.	d
394.	d	442.	c	490.	a	538.	a	586.	b	634.	a	682.	b	730.	a
395.	b	443.	c	491.	c	539.	c	587.	a	635.	c	683.	d	731.	c
396.	b	444.	c	492.	c	540.	d	588.	c	636.	c	684.	d	732.	d
397.	d	445.	d	493.	a	541.	d	589.	d	637.	b	685.	c	733.	c
398.	b	446.	e	494.	a	542.	a	590.	c	638.	a	686.	d	734.	d
399.	b	447.	b	495.	a	543.	d	591.	b	639.	b	687.	b	735.	c
400.	c	448.	c	496.	b	544.	d	592.	a	640.	c	688.	c	736.	a
401.	c	449.	a	497.	a	545.	d	593.	b	641.	a	689.	a	737.	d
402.	c	450.	a	498.	a	546.	d	594.	d	642.	b	690.	d	738.	c
403.	d	451.	c	499.	c	547.	b	595.	b	643.	a	691.	c	739.	d
404.	d	452.	a	500.	d	548.	a	596.	d	644.	b	692.	a	740.	d
405.	b	453.	a	501.	c	549.	b	597.	a	645.	e	693.	b	741.	d
406.	d	454.	c	502.	b	550.	d	598.	c	646.	c	694.	a	742.	b
407.	a	455.	a	503.	b	551.	d	599.	b	647.	b	695.	b	743.	c
408.	b	456.	a	504.	c	552.	c	600.	e	648.	b	696.	c	744.	a
409.	a	457.	a	505.	b	553.	c	601.	c	649.	d	697.	a	745.	b
410.	b	458.	c	506.	a	554.	b	602.	a	650.	b	698.	b	746.	b
411.	c	459.	a	507.	b	555.	b	603.	a	651.	c	699.	b	747.	a
412.	a	460.	c	508.	b	556.	c	604.	e	652.	a	700.	b	748.	b
413.	d	461.	c	509.	c	557.	d	605.	d	653.	c	701.	a	749.	a
414.	c	462.	a	510.	d	558.	b	606.	d	654.	b	702.	a	750.	d
415.	c	463.	b	511.	b	559.	d	607.	c	655.	a	703.	b	751.	d
416.	b	464.	a	512.	b	560.	a	608.	a	656.	b	704.	c	752.	c
417.	a	465.	b	513.	c	561.	d	609.	a	657.	c	705.	b	753.	c
418.	a	466.	c	514.	a	562.	d	610.	c	658.	a	706.	a	754.	b
419.	b	467.	a	515.	a	563.	c	611.	b	659.	c	707.	b	755.	b
420.	b	468.	b	516.	b	564.	a	612.	b	660.	a	708.	b	756.	c
421.	d	469.	a	517.	a	565.	a	613.	a	661.	c	709.	c	757.	a
422.	a	470.	b	518.	a	566.	d	614.	d	662.	a	710.	a	758.	b
423.	b	471.	b	519.	c	567.	b	615.	a	663.	b	711.	c	759.	d
424.	a	472.	c	520.	a	568.	c	616.	b	664.	a	712.	a	760.	c
425.	a	473.	b	521.	a	569.	b	617.	b	665.	d	713.	d	761.	a
426.	d	474.	c	522.	c	570.	a	618.	a	666.	d	714.	c	762.	c
427.	a	475.	d	523.	a	571.	b	619.	d	667.	b	715.	a	763.	c
428.	b	476.	c	524.	d	572.	a	620.	b	668.	a	716.	b	764.	d
429.	d	477.	b	525.	c	573.	b	621.	c	669.	c	717.	a	765.	b
430.	d	478.	c	526.	a	574.	a	622.	d	670.	d	718.	b	766.	d
431.	d	479.	b	527.	c	575.	b	623.	d	671.	b	719.	a	767.	a

768.	a	816.	c	864.	d	912.	b	960.	d	1008.	b	1056.	c	1104.	c
769.	b	817.	a	865.	a	913.	c	961.	a	1009.	b	1057.	d	1105.	c
770.	a	818.	c	866.	a	914.	c	962.	a	1010.	c	1058.	d	1106.	a
771.	a	819.	c	867.	c	915.	b	963.	d	1011.	a	1059.	c	1107.	d
772.	c	820.	b	868.	c	916.	c	964.	c	1012.	c	1060.	b	1108.	d
773.	c	821.	d	869.	c	917.	d	965.	a	1013.	c	1061.	d	1109.	a
774.	a	822.	b	870.	a	918.	d	966.	a	1014.	b	1062.	b	1110.	a
775.	b	823.	d	871.	c	919.	a	967.	d	1015.	c	1063.	c	1111.	a
776.	b	824.	b	872.	a	920.	b	968.	b	1016.	a	1064.	a	1112.	c
777.	a	825.	b	873.	a	921.	c	969.	a	1017.	c	1065.	a	1113.	d
778.	b	826.	c	874.	d	922.	c	970.	b	1018.	c	1066.	d	1114.	c
779.	a	827.	c	875.	b	923.	d	971.	c	1019.	d	1067.	d	1115.	d
780.	a	828.	d	876.	b	924.	d	972.	c	1020.	d	1068.	d	1116.	a
781.	c	829.	a	877.	b	925.	a	973.	b	1021.	b	1069.	d	1117.	a
782.	a	830.	d	878.	c	926.	c	974.	c	1022.	b	1070.	c	1118.	b
783.	b	831.	c	879.	a	927.	c	975.	c	1023.	b	1071.	b	1119.	c
784.	c	832.	c	880.	b	928.	b	976.	a	1024.	a	1072.	c	1120.	c
785.	a	833.	b	881.	c	929.	b	977.	c	1025.	a	1073.	c	1121.	c
786.	a	834.	c	882.	c	930.	b	978.	d	1026.	c	1074.	b	1122.	a
787.	d	835.	c	883.	c	931.	d	979.	c	1027.	c	1075.	b	1123.	a
788.	b	836.	d	884.	c	932.	a	980.	a	1028.	d	1076.	b	1124.	a
789.	a	837.	c	885.	c	933.	c	981.	b	1029.	b	1077.	a	1125.	c
790.	c	838.	d	886.	c	934.	a	982.	d	1030.	d	1078.	a	1126.	d
791.	c	839.	b	887.	d	935.	b	983.	c	1031.	c	1079.	b	1127.	d
792.	a	840.	b	888.	a	936.	c	984.	c	1032.	b	1080.	d	1128.	c
793.	a	841.	a	889.	c	937.	a	985.	d	1033.	b	1081.	b	1129.	a
794.	b	842.	a	890.	a	938.	a	986.	b	1034.	a	1082.	c	1130.	d
795.	b	843.	a	891.	d	939.	b	987.	b	1035.	d	1083.	c	1131.	b
796.	a	844.	a	892.	d	940.	a	988.	d	1036.	c	1084.	c	1132.	a
797.	d	845.	b	893.	c	941.	d	989.	b	1037.	a	1085.	c	1133.	d
798.	a	846.	d	894.	c	942.	a	990.	d	1038.	b	1086.	d	1134.	c
799.	a	847.	c	895.	d	943.	c	991.	d	1039.	b	1087.	c	1135.	b
800.	b	848.	a	896.	b	944.	b	992.	d	1040.	a	1088.	d	1136.	a
801.	b	849.	c	897.	b	945.	b	993.	c	1041.	b	1089.	a	1137.	a
802.	b	850.	d	898.	b	946.	b	994.	b	1042.	a	1090.	d	1138.	d
803.	a	851.	b	899.	b	947.	a	995.	a	1043.	d	1091.	c	1139.	c
804.	c	852.	a	900.	a	948.	b	996.	c	1044.	a	1092.	c	1140.	b
805.	c	853.	c	901.	a	949.	b	997.	b	1045.	c	1093.	c	1141.	d
806.	a	854.	c	902.	a	950.	c	998.	d	1046.	c	1094.	a	1142.	d
807.	c	855.	c	903.	d	951.	b	999.	b	1047.	c	1095.	c	1143.	b
808.	a	856.	c	904.	a	952.	c	1000.	c	1048.	b	1096.	b	1144.	c
809.	c	857.	a	905.	d	953.	a	1001.	c	1049.	b	1097.	a	1145.	b
810.	b	858.	c	906.	a	954.	b	1002.	d	1050.	d	1098.	a	1146.	c
811.	c	859.	d	907.	a	955.	b	1003.	b	1051.	a	1099.	c	1147.	a
812.	d	860.	a	908.	b	956.	c	1004.	d	1052.	b	1100.	c	1148.	a
813.	a	861.	a	909.	d	957.	c	1005.	b	1053.	b	1101.	d	1149.	a
814.	c	862.	d	910.	a	958.	a	1006.	a	1054.	c	1102.	a	1150.	d
815.	c	863.	d	911.	d	959.	d	1007.	b	1055.	b	1103.	a	1151.	d

1152.	a	1200.	b	1248.	a	1296.	a	1344.	c	1392.	c	1440.	a	1488.	d
1153.	d	1201.	d	1249.	b	1297.	c	1345.	a	1393.	b	1441.	a	1489.	a
1154.	c	1202.	c	1250.	b	1298.	b	1346.	a	1394.	d	1442.	b	1490.	a
1155.	a	1203.	d	1251.	c	1299.	d	1347.	b	1395.	b	1443.	c	1491.	d
1156.	d	1204.	a	1252.	c	1300.	a	1348.	c	1396.	b	1444.	a	1492.	c
1157.	d	1205.	c	1253.	b	1301.	d	1349.	a	1397.	d	1445.	d	1493.	d
1158.	c	1206.	d	1254.	a	1302.	c	1350.	b	1398.	a	1446.	d	1494.	c
1159.	d	1207.	b	1255.	b	1303.	d	1351.	c	1399.	c	1447.	d	1495.	a
1160.	b	1208.	b	1256.	b	1304.	c	1352.	b	1400.	d	1448.	b	1496.	b
1161.	d	1209.	b	1257.	b	1305.	c	1353.	a	1401.	a	1449.	a	1497.	a
1162.	a	1210.	c	1258.	b	1306.	d	1354.	a	1402.	b	1450.	a	1498.	b
1163.	a	1211.	d	1259.	a	1307.	c	1355.	d	1403.	c	1451.	b	1499.	b
1164.	b	1212.	c	1260.	c	1308.	a	1356.	b	1404.	c	1452.	d	1500.	a
1165.	d	1213.	b	1261.	b	1309.	a	1357.	a	1405.	b	1453.	d	1501.	d
1166.	a	1214.	d	1262.	c	1310.	a	1358.	b	1406.	a	1454.	b	1502.	b
1167.	b	1215.	b	1263.	b	1311.	a	1359.	a	1407.	c	1455.	a	1503.	e
1168.	a	1216.	b	1264.	b	1312.	b	1360.	a	1408.	a	1456.	b	1504.	c
1169.	c	1217.	c	1265.	c	1313.	b	1361.	a	1409.	c	1457.	a	1505.	b
1170.	c	1218.	b	1266.	c	1314.	a	1362.	b	1410.	b	1458.	d	1506.	a
1171.	d	1219.	d	1267.	c	1315.	a	1363.	b	1411.	b	1459.	d	1507.	c
1172.	a	1220.	b	1268.	d	1316.	a	1364.	a	1412.	c	1460.	d	1508.	c
1173.	b	1221.	c	1269.	a	1317.	a	1365.	c	1413.	d	1461.	c	1509.	d
1174.	a	1222.	b	1270.	d	1318.	a	1366.	d	1414.	c	1462.	b	1510.	c
1175.	d	1223.	d	1271.	c	1319.	d	1367.	c	1415.	a	1463.	c	1511.	b
1176.	d	1224.	c	1272.	c	1320.	a	1368.	b	1416.	b	1464.	b	1512.	b
1177.	a	1225.	c	1273.	b	1321.	c	1369.	b	1417.	b	1465.	d	1513.	c
1178.	c	1226.	b	1274.	b	1322.	b	1370.	c	1418.	b	1466.	b	1514.	a
1179.	a	1227.	a	1275.	b	1323.	a	1371.	b	1419.	c	1467.	c	1515.	b
1180.	a	1228.	c	1276.	c	1324.	a	1372.	a	1420.	a	1468.	a	1516.	b
1181.	a	1229.	c	1277.	c	1325.	a	1373.	b	1421.	b	1469.	b	1517.	b
1182.	b	1230.	d	1278.	a	1326.	d	1374.	d	1422.	b	1470.	a	1518.	c
1183.	b	1231.	b	1279.	d	1327.	c	1375.	b	1423.	a	1471.	d	1519.	b
1184.	b	1232.	a	1280.	d	1328.	b	1376.	d	1424.	c	1472.	b	1520.	b
1185.	c	1233.	c	1281.	a	1329.	a	1377.	a	1425.	c	1473.	c	1521.	c
1186.	c	1234.	c	1282.	c	1330.	b	1378.	a	1426.	a	1474.	b	1522.	d
1187.	c	1235.	a	1283.	d	1331.	a	1379.	c	1427.	a	1475.	b	1523.	d
1188.	c	1236.	a	1284.	d	1332.	b	1380.	d	1428.	a	1476.	d	1524.	a
1189.	a	1237.	b	1285.	d	1333.	a	1381.	d	1429.	a	1477.	c	1525.	b
1190.	d	1238.	b	1286.	a	1334.	d	1382.	b	1430.	a	1478.	a	1526.	c
1191.	d	1239.	b	1287.	c	1335.	d	1383.	b	1431.	a	1479.	b	1527.	d
1192.	c	1240.	b	1288.	d	1336.	c	1384.	b	1432.	d	1480.	b	1528.	a
1193.	d	1241.	c	1289.	a	1337.	a	1385.	b	1433.	d	1481.	d	1529.	c
1194.	d	1242.	c	1290.	a	1338.	d	1386.	c	1434.	b	1482.	c	1530.	c
1195.	c	1243.	b	1291.	d	1339.	b	1387.	d	1435.	b	1483.	c	1531.	d
1196.	b	1244.	b	1292.	d	1340.	b	1388.	a	1436.	b	1484.	c	1532.	a
1197.	a	1245.	a	1293.	c	1341.	c	1389.	b	1437.	d	1485.	a	1533.	c
1198.	c	1246.	b	1294.	d	1342.	a	1390.	d	1438.	d	1486.	c	1534.	d
1199.	c	1247.	b	1295.	b	1343.	a	1391.	a	1439.	b	1487.	a	1535.	d

1536.	c	1584.	d	1632.	b	1680.	d	1728.	c	1776.	d	1824.	a	1872.	b
1537.	b	1585.	b	1633.	a	1681.	c	1729.	d	1777.	c	1825.	b	1873.	c
1538.	c	1586.	d	1634.	a	1682.	b	1730.	c	1778.	b	1826.	d	1874.	d
1539.	a	1587.	b	1635.	c	1683.	a	1731.	d	1779.	a	1827.	d	1875.	a
1540.	a	1588.	c	1636.	c	1684.	a	1732.	d	1780.	c	1828.	a	1876.	b
1541.	c	1589.	b	1637.	c	1685.	a	1733.	b	1781.	c	1829.	a	1877.	a
1542.	a	1590.	b	1638.	b	1686.	b	1734.	a	1782.	b	1830.	b	1878.	c
1543.	c	1591.	d	1639.	b	1687.	a	1735.	d	1783.	c	1831.	c	1879.	d
1544.	b	1592.	d	1640.	a	1688.	b	1736.	a	1784.	c	1832.	d	1880.	b
1545.	a	1593.	c	1641.	d	1689.	d	1737.	b	1785.	d	1833.	d	1881.	c
1546.	b	1594.	c	1642.	a	1690.	c	1738.	d	1786.	d	1834.	b	1882.	a
1547.	d	1595.	a	1643.	d	1691.	b	1739.	c	1787.	c	1835.	c	1883.	a
1548.	c	1596.	c	1644.	d	1692.	c	1740.	d	1788.	d	1836.	c	1884.	a
1549.	b	1597.	c	1645.	c	1693.	c	1741.	b	1789.	c	1837.	d	1885.	b
1550.	a	1598.	b	1646.	d	1694.	c	1742.	b	1790.	b	1838.	a	1886.	d
1551.	c	1599.	d	1647.	c	1695.	a	1743.	d	1791.	c	1839.	d	1887.	a
1552.	a	1600.	b	1648.	a	1696.	c	1744.	b	1792.	d	1840.	c	1888.	b
1553.	d	1601.	c	1649.	c	1697.	c	1745.	a	1793.	d	1841.	b	1889.	c
1554.	a	1602.	b	1650.	c	1698.	c	1746.	a	1794.	c	1842.	c	1890.	c
1555.	c	1603.	b	1651.	c	1699.	a	1747.	b	1795.	a	1843.	d	1891.	d
1556.	b	1604.	d	1652.	b	1700.	d	1748.	a	1796.	a	1844.	b	1892.	b
1557.	c	1605.	d	1653.	d	1701.	c	1749.	d	1797.	b	1845.	a	1893.	d
1558.	d	1606.	d	1654.	d	1702.	d	1750.	e	1798.	d	1846.	d	1894.	a
1559.	b	1607.	c	1655.	d	1703.	b	1751.	a	1799.	c	1847.	c	1895.	d
1560.	c	1608.	a	1656.	c	1704.	a	1752.	c	1800.	b	1848.	a	1896.	e
1561.	a	1609.	b	1657.	d	1705.	a	1753.	d	1801.	c	1849.	d	1897.	c
1562.	a	1610.	b	1658.	d	1706.	c	1754.	d	1802.	a	1850.	a	1898.	d
1563.	b	1611.	c	1659.	a	1707.	d	1755.	a	1803.	a	1851.	d	1899.	a
1564.	a	1612.	a	1660.	a	1708.	d	1756.	b	1804.	d	1852.	c	1900.	a
1565.	c	1613.	d	1661.	c	1709.	a	1757.	b	1805.	b	1853.	c	1901.	b
1566.	c	1614.	d	1662.	d	1710.	d	1758.	c	1806.	c	1854.	d	1902.	a
1567.	b	1615.	d	1663.	c	1711.	a	1759.	a	1807.	b	1855.	c	1903.	d
1568.	a	1616.	c	1664.	c	1712.	a	1760.	d	1808.	b	1856.	c	1904.	b
1569.	b	1617.	b	1665.	d	1713.	d	1761.	c	1809.	a	1857.	d	1905.	c
1570.	d	1618.	a	1666.	d	1714.	c	1762.	b	1810.	c	1858.	c	1906.	d
1571.	c	1619.	b	1667.	b	1715.	b	1763.	d	1811.	b	1859.	c	1907.	c
1572.	d	1620.	d	1668.	a	1716.	b	1764.	c	1812.	d	1860.	a	1908.	d
1573.	b	1621.	d	1669.	c	1717.	b	1765.	b	1813.	b	1861.	d	1909.	c
1574.	c	1622.	a	1670.	b	1718.	b	1766.	b	1814.	b	1862.	c	1910.	b
1575.	a	1623.	b	1671.	b	1719.	c	1767.	a	1815.	c	1863.	a	1911.	b
1576.	c	1624.	b	1672.	b	1720.	b	1768.	a	1816.	a	1864.	d	1912.	b
1577.	a	1625.	b	1673.	d	1721.	d	1769.	a	1817.	b	1865.	b	1913.	c
1578.	d	1626.	b	1674.	a	1722.	a	1770.	d	1818.	c	1866.	c	1914.	b
1579.	b	1627.	c	1675.	d	1723.	a	1771.	c	1819.	d	1867.	a	1915.	c
1580.	b	1628.	d	1676.	b	1724.	d	1772.	a	1820.	a	1868.	c	1916.	a
1581.	b	1629.	c	1677.	b	1725.	c	1773.	c	1821.	c	1869.	a	1917.	d
1582.	d	1630.	c	1678.	b	1726.	d	1774.	c	1822.	d	1870.	d	1918.	a
1583.	d	1631.	d	1679.	a	1727.	d	1775.	a	1823.	c	1871.	b	1919.	c

1920.	e	1968.	d	2016.	c	2064.	d	2112.	c	2160.	d	2208.	a	2256.	a
1921.	d	1969.	c	2017.	b	2065.	d	2113.	d	2161.	a	2209.	b	2257.	c
1922.	a	1970.	b	2018.	d	2066.	d	2114.	d	2162.	d	2210.	c	2258.	a
1923.	d	1971.	a	2019.	b	2067.	d	2115.	a	2163.	c	2211.	c	2259.	c
1924.	a	1972.	d	2020.	d	2068.	c	2116.	a	2164.	d	2212.	a	2260.	d
1925.	d	1973.	d	2021.	c	2069.	b	2117.	c	2165.	a	2213.	a	2261.	b
1926.	d	1974.	c	2022.	b	2070.	c	2118.	a	2166.	d	2214.	c	2262.	c
1927.	b	1975.	a	2023.	a	2071.	a	2119.	a	2167.	b	2215.	d	2263.	c
1928.	b	1976.	b	2024.	a	2072.	a	2120.	d	2168.	a	2216.	c	2264.	c
1929.	d	1977.	b	2025.	d	2073.	a	2121.	a	2169.	c	2217.	c	2265.	b
1930.	a	1978.	a	2026.	a	2074.	c	2122.	d	2170.	a	2218.	d	2266.	d
1931.	d	1979.	c	2027.	c	2075.	a	2123.	a	2171.	d	2219.	c	2267.	a
1932.	b	1980.	c	2028.	d	2076.	b	2124.	d	2172.	c	2220.	d	2268.	c
1933.	a	1981.	c	2029.	b	2077.	c	2125.	b	2173.	d	2221.	d	2269.	a
1934.	c	1982.	d	2030.	a	2078.	c	2126.	a	2174.	c	2222.	c	2270.	d
1935.	d	1983.	a	2031.	c	2079.	a	2127.	b	2175.	a	2223.	b	2271.	d
1936.	a	1984.	a	2032.	c	2080.	a	2128.	c	2176.	c	2224.	a	2272.	b
1937.	a	1985.	c	2033.	b	2081.	d	2129.	a	2177.	a	2225.	c	2273.	b
1938.	b	1986.	d	2034.	b	2082.	c	2130.	b	2178.	d	2226.	a	2274.	b
1939.	c	1987.	b	2035.	c	2083.	d	2131.	d	2179.	a	2227.	c	2275.	b
1940.	a	1988.	d	2036.	c	2084.	c	2132.	b	2180.	d	2228.	a	2276.	a
1941.	a	1989.	d	2037.	d	2085.	a	2133.	c	2181.	d	2229.	b	2277.	c
1942.	a	1990.	a	2038.	d	2086.	d	2134.	a	2182.	b	2230.	a	2278.	c
1943.	c	1991.	d	2039.	c	2087.	c	2135.	c	2183.	a	2231.	a	2279.	c
1944.	a	1992.	d	2040.	a	2088.	b	2136.	e	2184.	c	2232.	b	2280.	b
1945.	b	1993.	a	2041.	b	2089.	c	2137.	c	2185.	d	2233.	b	2281.	a
1946.	d	1994.	b	2042.	b	2090.	d	2138.	c	2186.	a	2234.	b	2282.	a
1947.	a	1995.	d	2043.	d	2091.	a	2139.	a	2187.	c	2235.	a	2283.	b
1948.	c	1996.	b	2044.	a	2092.	a	2140.	a	2188.	d	2236.	a	2284.	b
1949.	a	1997.	a	2045.	a	2093.	d	2141.	c	2189.	a	2237.	c	2285.	b
1950.	a	1998.	b	2046.	c	2094.	c	2142.	a	2190.	a	2238.	c	2286.	a
1951.	c	1999.	c	2047.	d	2095.	a	2143.	c	2191.	e	2239.	d	2287.	c
1952.	d	2000.	b	2048.	b	2096.	c	2144.	a	2192.	a	2240.	a	2288.	d
1953.	a	2001.	d	2049.	b	2097.	a	2145.	a	2193.	b	2241.	c	2289.	b
1954.	b	2002.	d	2050.	d	2098.	a	2146.	b	2194.	a	2242.	b	2290.	d
1955.	a	2003.	d	2051.	c	2099.	a	2147.	b	2195.	d	2243.	b	2291.	a
1956.	c	2004.	d	2052.	a	2100.	b	2148.	d	2196.	b	2244.	a	2292.	c
1957.	a	2005.	e	2053.	b	2101.	b	2149.	c	2197.	a	2245.	c	2293.	d
1958.	c	2006.	a	2054.	d	2102.	a	2150.	b	2198.	c	2246.	b	2294.	a
1959.	a	2007.	d	2055.	d	2103.	c	2151.	a	2199.	b	2247.	a	2295.	d
1960.	d	2008.	a	2056.	c	2104.	b	2152.	a	2200.	c	2248.	a	2296.	c
1961.	c	2009.	c	2057.	b	2105.	b	2153.	c	2201.	d	2249.	c	2297.	c
1962.	b	2010.	b	2058.	d	2106.	a	2154.	d	2202.	a	2250.	d	2298.	b
1963.	a	2011.	d	2059.	a	2107.	d	2155.	c	2203.	a	2251.	c	2299.	a
1964.	d	2012.	c	2060.	d	2108.	d	2156.	c	2204.	d	2252.	a	2300.	c
1965.	b	2013.	b	2061.	d	2109.	d	2157.	c	2205.	a	2253.	b	2301.	c
1966.	c	2014.	a	2062.	d	2110.	a	2158.	b	2206.	a	2254.	c	2302.	d
1967.	b	2015.	c	2063.	d	2111.	b	2159.	a	2207.	c	2255.	b	2303.	d

2304.	b	2352.	c	2400.	c	2448.	d	2496.	a	2544.	b	2592.	a	2640.	a
2305.	c	2353.	b	2401.	b	2449.	c	2497.	b	2545.	b	2593.	a	2641.	a
2306.	b	2354.	d	2402.	d	2450.	c	2498.	b	2546.	a	2594.	d	2642.	a
2307.	a	2355.	b	2403.	a	2451.	b	2499.	b	2547.	d	2595.	a	2643.	a
2308.	d	2356.	c	2404.	c	2452.	d	2500.	c	2548.	c	2596.	c	2644.	d
2309.	a	2357.	a	2405.	a	2453.	b	2501.	a	2549.	a	2597.	d	2645.	a
2310.	b	2358.	d	2406.	c	2454.	d	2502.	a	2550.	c	2598.	a	2646.	a
2311.	c	2359.	c	2407.	a	2455.	c	2503.	d	2551.	a	2599.	b	2647.	a
2312.	a	2360.	b	2408.	b	2456.	b	2504.	d	2552.	b	2600.	b	2648.	a
2313.	d	2361.	d	2409.	a	2457.	a	2505.	d	2553.	d	2601.	c	2649.	a
2314.	d	2362.	a	2410.	d	2458.	b	2506.	a	2554.	d	2602.	a	2650.	a
2315.	d	2363.	b	2411.	b	2459.	d	2507.	a	2555.	c	2603.	a	2651.	a
2316.	a	2364.	d	2412.	c	2460.	d	2508.	b	2556.	a	2604.	a	2652.	a
2317.	b	2365.	b	2413.	b	2461.	b	2509.	b	2557.	c	2605.	a	2653.	a
2318.	b	2366.	b	2414.	a	2462.	c	2510.	b	2558.	d	2606.	a	2654.	a
2319.	c	2367.	c	2415.	a	2463.	a	2511.	b	2559.	a	2607.	d	2655.	a
2320.	c	2368.	b	2416.	b	2464.	a	2512.	a	2560.	d	2608.	a	2656.	c
2321.	d	2369.	a	2417.	c	2465.	a	2513.	b	2561.	a	2609.	a	2657.	c
2322.	b	2370.	a	2418.	a	2466.	b	2514.	b	2562.	a	2610.	a	2658.	a
2323.	d	2371.	d	2419.	c	2467.	d	2515.	c	2563.	d	2611.	a	2659.	d
2324.	d	2372.	a	2420.	c	2468.	b	2516.	a	2564.	b	2612.	a	2660.	a
2325.	a	2373.	d	2421.	b	2469.	a	2517.	a	2565.	d	2613.	a	2661.	a
2326.	c	2374.	d	2422.	b	2470.	d	2518.	c	2566.	c	2614.	a	2662.	a
2327.	b	2375.	a	2423.	d	2471.	c	2519.	a	2567.	b	2615.	b	2663.	b
2328.	a	2376.	b	2424.	d	2472.	b	2520.	d	2568.	c	2616.	d	2664.	a
2329.	d	2377.	d	2425.	b	2473.	d	2521.	b	2569.	b	2617.	a	2665.	a
2330.	b	2378.	c	2426.	b	2474.	b	2522.	a	2570.	a	2618.	a	2666.	d
2331.	d	2379.	b	2427.	b	2475.	d	2523.	b	2571.	b	2619.	a	2667.	d
2332.	a	2380.	a	2428.	b	2476.	b	2524.	b	2572.	a	2620.	a	2668.	a
2333.	d	2381.	c	2429.	a	2477.	c	2525.	a	2573.	d	2621.	a	2669.	a
2334.	a	2382.	d	2430.	a	2478.	d	2526.	b	2574.	a	2622.	a	2670.	b
2335.	b	2383.	d	2431.	b	2479.	a	2527.	a	2575.	a	2623.	a	2671.	a
2336.	c	2384.	d	2432.	d	2480.	b	2528.	d	2576.	a	2624.	a	2672.	a
2337.	a	2385.	c	2433.	b	2481.	d	2529.	d	2577.	a	2625.	a	2673.	c
2338.	d	2386.	a	2434.	a	2482.	b	2530.	b	2578.	a	2626.	a	2674.	d
2339.	a	2387.	a	2435.	b	2483.	c	2531.	b	2579.	a	2627.	a	2675.	c
2340.	d	2388.	b	2436.	d	2484.	b	2532.	b	2580.	a	2628.	a	2676.	a
2341.	a	2389.	a	2437.	d	2485.	a	2533.	d	2581.	a	2629.	a	2677.	a
2342.	d	2390.	a	2438.	d	2486.	c	2534.	b	2582.	b	2630.	a	2678.	a
2343.	a	2391.	c	2439.	a	2487.	d	2535.	c	2583.	a	2631.	a	2679.	c
2344.	c	2392.	b	2440.	d	2488.	a	2536.	b	2584.	a	2632.	a	2680.	d
2345.	b	2393.	b	2441.	a	2489.	a	2537.	a	2585.	d	2633.	a	2681.	d
2346.	c	2394.	a	2442.	a	2490.	a	2538.	d	2586.	a	2634.	a	2682.	c
2347.	c	2395.	a	2443.	c	2491.	b	2539.	b	2587.	a	2635.	a	2683.	a
2348.	a	2396.	c	2444.	d	2492.	a	2540.	a	2588.	a	2636.	a	2684.	b
2349.	d	2397.	a	2445.	b	2493.	c	2541.	a	2589.	a	2637.	a	2685.	a
2350.	a	2398.	d	2446.	d	2494.	b	2542.	a	2590.	a	2638.	a	2686.	a
2351.	b	2399.	a	2447.	c	2495.	b	2543.	d	2591.	a	2639.	a	2687.	b

2688.	b	2736.	a	2784.	b	2832.	c	2880.	b	2928.	a	2976.	b	3024.	c
2689.	a	2737.	b	2785.	a	2833.	b	2881.	a	2929.	b	2977.	a	3025.	d
2690.	b	2738.	b	2786.	c	2834.	a	2882.	c	2930.	a	2978.	b	3026.	d
2691.	a	2739.	a	2787.	d	2835.	b	2883.	c	2931.	a	2979.	a	3027.	d
2692.	c	2740.	b	2788.	c	2836.	c	2884.	a	2932.	d	2980.	a	3028.	a
2693.	d	2741.	d	2789.	c	2837.	b	2885.	a	2933.	a	2981.	a	3029.	d
2694.	c	2742.	a	2790.	a	2838.	c	2886.	c	2934.	d	2982.	d	3030.	c
2695.	d	2743.	b	2791.	d	2839.	a	2887.	c	2935.	b	2983.	b	3031.	a
2696.	c	2744.	d	2792.	b	2840.	c	2888.	b	2936.	c	2984.	d	3032.	b
2697.	a	2745.	c	2793.	d	2841.	b	2889.	d	2937.	b	2985.	a	3033.	d
2698.	b	2746.	e	2794.	a	2842.	b	2890.	d	2938.	d	2986.	b	3034.	d
2699.	d	2747.	e	2795.	b	2843.	d	2891.	b	2939.	a	2987.	a	3035.	a
2700.	d	2748.	d	2796.	a	2844.	b	2892.	a	2940.	b	2988.	b	3036.	d
2701.	c	2749.	d	2797.	c	2845.	b	2893.	a	2941.	c	2989.	b	3037.	d
2702.	c	2750.	c	2798.	b	2846.	b	2894.	c	2942.	d	2990.	b	3038.	d
2703.	b	2751.	a	2799.	c	2847.	c	2895.	d	2943.	b	2991.	a	3039.	d
2704.	b	2752.	c	2800.	b	2848.	a	2896.	d	2944.	a	2992.	d	3040.	d
2705.	a	2753.	a	2801.	b	2849.	c	2897.	c	2945.	d	2993.	c	3041.	d
2706.	c	2754.	c	2802.	a	2850.	c	2898.	a	2946.	b	2994.	d	3042.	d
2707.	d	2755.	d	2803.	b	2851.	d	2899.	c	2947.	b	2995.	b	3043.	d
2708.	b	2756.	a	2804.	b	2852.	a	2900.	d	2948.	c	2996.	b	3044.	c
2709.	b	2757.	b	2805.	b	2853.	d	2901.	a	2949.	d	2997.	c	3045.	a
2710.	a	2758.	b	2806.	b	2854.	a	2902.	d	2950.	c	2998.	b	3046.	a
2711.	c	2759.	a	2807.	c	2855.	a	2903.	c	2951.	a	2999.	d	3047.	c
2712.	b	2760.	c	2808.	c	2856.	c	2904.	d	2952.	a	3000.	d	3048.	a
2713.	b	2761.	a	2809.	a	2857.	a	2905.	c	2953.	b	3001.	a	3049.	a
2714.	b	2762.	a	2810.	b	2858.	a	2906.	a	2954.	b	3002.	b	3050.	a
2715.	b	2763.	a	2811.	b	2859.	c	2907.	d	2955.	b	3003.	c	3051.	b
2716.	d	2764.	b	2812.	c	2860.	a	2908.	c	2956.	b	3004.	d	3052.	c
2717.	d	2765.	d	2813.	b	2861.	d	2909.	a	2957.	b	3005.	d	3053.	b
2718.	c	2766.	b	2814.	b	2862.	a	2910.	b	2958.	a	3006.	b	3054.	d
2719.	b	2767.	d	2815.	d	2863.	b	2911.	d	2959.	a	3007.	a	3055.	d
2720.	a	2768.	a	2816.	a	2864.	d	2912.	c	2960.	b	3008.	b	3056.	d
2721.	d	2769.	c	2817.	d	2865.	b	2913.	b	2961.	a	3009.	a	3057.	d
2722.	c	2770.	d	2818.	c	2866.	d	2914.	c	2962.	c	3010.	b	3058.	b
2723.	c	2771.	d	2819.	b	2867.	d	2915.	a	2963.	a	3011.	b	3059.	a
2724.	c	2772.	c	2820.	b	2868.	d	2916.	b	2964.	c	3012.	a	3060.	c
2725.	b	2773.	a	2821.	d	2869.	c	2917.	c	2965.	a	3013.	b	3061.	a
2726.	a	2774.	a	2822.	a	2870.	d	2918.	b	2966.	d	3014.	a	3062.	a
2727.	c	2775.	d	2823.	c	2871.	c	2919.	c	2967.	c	3015.	b	3063.	b
2728.	b	2776.	c	2824.	d	2872.	a	2920.	a	2968.	b	3016.	d	3064.	c
2729.	c	2777.	b	2825.	b	2873.	d	2921.	c	2969.	d	3017.	d	3065.	c
2730.	b	2778.	a	2826.	d	2874.	b	2922.	d	2970.	b	3018.	c	3066.	b
2731.	d	2779.	c	2827.	a	2875.	a	2923.	a	2971.	a	3019.	c	3067.	a
2732.	b	2780.	a	2828.	b	2876.	a	2924.	b	2972.	c	3020.	d	3068.	c
2733.	c	2781.	a	2829.	b	2877.	b	2925.	d	2973.	a	3021.	d	3069.	c
2734.	e	2782.	a	2830.	a	2878.	d	2926.	a	2974.	b	3022.	b	3070.	a
2735.	d	2783.	a	2831.	b	2879.	b	2927.	c	2975.	a	3023.	d	3071.	b

3072.	c	3094.	a	3116.	d	3138.	b	3160.	c	3182.	c	3204.	b	3226.	e
3073.	d	3095.	a	3117.	d	3139.	d	3161.	a	3183.	d	3205.	d	3227.	b
3074.	b	3096.	c	3118.	a	3140.	c	3162.	b	3184.	a	3206.	c	3228.	d
3075.	a	3097.	d	3119.	d	3141.	c	3163.	d	3185.	c	3207.	d	3229.	b
3076.	b	3098.	d	3120.	d	3142.	d	3164.	d	3186.	a	3208.	a	3230.	d
3077.	c	3099.	b	3121.	d	3143.	c	3165.	d	3187.	c	3209.	e	3231.	b
3078.	d	3100.	a	3122.	d	3144.	d	3166.	c	3188.	b	3210.	a	3232.	c
3079.	a	3101.	d	3123.	b	3145.	c	3167.	c	3189.	c	3211.	c	3233.	c
3080.	d	3102.	a	3124.	d	3146.	d	3168.	b	3190.	a	3212.	d	3234.	a
3081.	b	3103.	a	3125.	c	3147.	d	3169.	d	3191.	a	3213.	a	3235.	b
3082.	d	3104.	a	3126.	b	3148.	a	3170.	b	3192.	d	3214.	d	3236.	b
3083.	b	3105.	d	3127.	a	3149.	c	3171.	d	3193.	c	3215.	c	3237.	a
3084.	d	3106.	a	3128.	d	3150.	a	3172.	d	3194.	e	3216.	a	3238.	a
3085.	d	3107.	d	3129.	d	3151.	a	3173.	d	3195.	d	3217.	c	3239.	b
3086.	a	3108.	d	3130.	d	3152.	b	3174.	d	3196.	d	3218.	b	3240.	a
3087.	d	3109.	d	3131.	d	3153.	d	3175.	d	3197.	c	3219.	c	3241.	a
3088.	d	3110.	c	3132.	c	3154.	a	3176.	a	3198.	d	3220.	a	3242.	a
3089.	a	3111.	b	3133.	c	3155.	d	3177.	b	3199.	a	3221.	d	3243.	d
3090.	b	3112.	d	3134.	d	3156.	d	3178.	c	3200.	d	3222.	c	*****	
3091.	c	3113.	a	3135.	a	3157.	a	3179.	a	3201.	d	3223.	a		
3092.	d	3114.	c	3136.	a	3158.	c	3180.	c	3202.	c	3224.	a		
3093.	d	3115.	b	3137.	a	3159.	d	3181.	a	3203.	d	3225.	c		

PART-II(A)

MULTIPLE CHOICE QUESTIONS (MCQs) FOR

ELECTRICAL SUPERVISOR CERTIFICATE OF COMPETENCY (SCC)-HT AND CHARTERED ELECTRICAL SAFETY ENGINEER (CESE)- UPTO 11KV

- 1 The transient stability and the steady state stability of a power transmission system_____.
- maintain synchronism between machine and tie lines at all the circumstances
 - maintains frequency exactly at 50 Hz
 - maintain voltage regulation precisely
 - all of the mentioned
- 2 We can say a system is stable at steady state is not affected by _____.
- line losses
 - line reactance
 - generator reactance
 - excitation of alternators
- 3 The transient instabilities can occur in a system by _____
- Sudden load changes
 - Switching operation
 - Faults
 - Sudden load changes, switching operation and faults
- 4 Post a three phase fault that occurs in a system, then its transient stability can be examined using _____
- solution of swing equation
 - equal area criterion
 - solution of swing equation and equal area criterion
 - solution of swing equation or equal area criterion
- 5 Which of the following transmission line can be considered as short transmission line?
- Transmission line of length up to 600 Km
 - Transmission line of length up to 500 Km
 - Transmission line of length up to 200 Km
 - Transmission line of length up to 80 Km
- 6 Which of the following is correct operating voltage range for short transmission lines?
- Less than 456 KV
 - Less than 132 KV
 - Less than 20 KV
 - Less than 100 KV
- 7 What is the line to earth capacitance value of the short transmission line?
- Very high
 - Medium
 - Low
 - Negligible
- 8 Performance of short transmission lines depends on which of the following?
- Resistance and Capacitance
 - Resistance and Inductance
 - Inductance and Capacitance
 - Resistance, Inductance and Capacitance
- 9 Performance analysis of short transmission line is done _____.
- By symmetrical component analysis method
 - By reactance diagram
 - On per phase basis
 - By neglecting line inductance
- 10 What is the value of shunt conductance of short transmission line?
- Very high
 - Medium
 - Low
 - Negligible
- 11 Series inductance and series resistance of short transmission lines are taken as_____.
- Lumped and Distributed
 - Distributed and Lumped
 - Both Lumped
 - Both Distributed

- 12 Which of the following transmission line can be considered as medium transmission line?
- Transmission line of length up to 600 Km
 - Transmission line of length up to 500 Km
 - Transmission line of length up to 200 Km
 - Transmission line of length up to 80 Km
- 13 Which of the following is correct operating voltage range for medium transmission lines?
- More than 765 KV
 - More than 400 KV
 - More than 20 KV
 - More than 132 KV
- 14 What is the value of the charging current flowing to earth in medium transmission line?
- Very high
 - Medium
 - Negligible
 - No capacitance
- 15 Performance of short transmission lines depends on which of the following?
- Resistance and Capacitance
 - Resistance and Inductance
 - Inductance and Capacitance
 - Resistance, Inductance and Capacitance
- 16 Performance analysis of medium transmission line is done_____.
- By reactance diagram
 - By symmetrical component analysis method
 - By neglecting line inductance
 - On per phase basis
- 17 What is the value of shunt capacitance of medium transmission line?
- Very high
 - Medium
 - Zero
 - Negligible
- 18 Series inductance and series resistance of medium transmission lines are taken as:
- Distributed and Lumped
 - Lumped and Distributed
 - Distributed
 - Lumped
- 19 Which of the following is like equivalent circuit of medium transmission line?
- Series RLC circuit
 - RLC circuit in pie form
 - Series RL circuit
 - Parallel RL circuit
- 20 Length of long transmission line is more than_____.
- 80 Km
 - 50 Km
 - 120 Km
 - 200 Km
- 21 In long transmission lines Resistance and Capacitance parameters of lines are connected in_____.
- Series, shunt
 - Series, series
 - Shunt, shunt
 - Shunt, parallel
- 22 Range of surge impedance for an overhead transmission line is _____.
- 12 Ω – 144 Ω
 - 40 Ω – 60 Ω
 - 400 Ω – 600 Ω
 - 300 Ω – 900 Ω
- 23 Range of surge impedance for an underground cable is _____.
- 12 Ω – 144 Ω
 - 40 Ω – 60 Ω
 - 400 Ω – 600 Ω
 - 300 Ω – 900 Ω
- 24 Synchronous phase modifiers are installed at which of the following position of the transmission line?

- a. Receiving end
b. Sending end
c. Between receiving end and sending end
d. Near receiving end
- 25 The voltage rating of long transmission line is _____.
- a. 20 KV to 100 KV
b. Up to 20 KV
c. Above 100 KV
d. 60 KV to 80 KV
- 26 What is the value of characteristics impedance for loss free transmission line?
- a. $\sqrt{L/C}$
b. $\sqrt{R/C}$
c. \sqrt{LC}
d. $\sqrt{C/L}$
- 27 The leakage current through the shunt admittance is _____.
- a. Maximum at sending end
b. Maximum at receiving end
c. Uniform over length of line
d. Maximum at centre of line
- 28 A transmission and distribution engineer needed to design the sub transmission substation. The tapping component needed will be _____.
- a. feeder
b. distributor
c. transmitter
d. tap-changing transformer
- 29 While designing the distribution to locality of one lac population with medium dense load requirement, we can employ _____.
- a. radial system
b. parallel system
c. ring main system
d. any of the mentioned
- 30 A _____ distribution system is more reliable than the _____ distribution system.
- a. parallel, radial
b. parallel, ring
c. radial, parallel
d. ring, parallel
- 31 While designing the distribution sub stations by the designer, it is required to use the _____ for the discrete power tapping.
- a. distributor
b. power transformer
c. distribution transformer
d. feeder
- 32 For the given circuit diagram for the substation fed with 315 kV, the voltage between the two outer conductors is _____.
- a. 445.5 kV
b. 890 kV
c. 630 kV
d. 223 kV
- 33 The ratio of dielectric stress of the on the cable corresponding to the maximum and minimum is _____.
- a. R/r
b. r/R
c. $r \cdot R$
d. R/r^2
- 34 Grading of the cables is performed in order to achieve _____.(i) uniform stress (ii) reduction in quantity of insulation(iii) reduction in quality of insulation
- a. (i), (ii)
b. (ii)
c. (i), (iii)
d. (ii), (iii)
- 35 Dielectric power loss of a transmission line cable operating for 'V' volts, 'f' Hz having a capacitance of 'C' Farads with the tangent loss angle of δ is _____
- a. $\omega CV^2 \tan \delta$
b. $\omega CV^2 / \tan \delta$
c. $\tan \delta / \omega CV^2$
d. $\omega CV^2 (\tan \delta)^2$

- 36 How does grading neutralize the potential distribution across the units of the suspension insulators?
- By forming capacitances to cancel the charging current from link pins
 - By forming capacitances with link pin to cancel the charging current from them
 - By increasing the capacitance of lower insulator units
 - By decreasing the capacitance of lower insulator units
- 37 For a line-man while measuring the string efficiency of the insulator installation done, observes that it shows a reading of 100%. This means_____.
- equal potential across each insulator disc
 - one of the insulator disc is shorted
 - zero potential across each disc
 - none of the mentioned
- 38 The pin type insulators are generally not used for the voltage range exceeding_____.
- 33kV
 - 66kV
 - 25kV
 - 11kV
- 39 If the frequency of the transmission line is changed from 50 Hz to 100 Hz, then the string efficiency _____.
- remains unchanged
 - increases
 - decreases
 - May or may not increase depending on the parameters
- 40 How can one think of reducing the earth capacitance of line?
- Using guard ring
 - Using special designed earth capacitances
 - Implementing parallel insulator lines
 - Any of the mentioned
- 41 Which of the following material is not used for overhead line insulators?
- Porcelain
 - Glass
 - PVC
 - Steatite
- 42 Pin type insulators are mostly subjected to which type of mechanical stress?
- Compressive stress
 - Tensile stress
 - Both tensile and compressive stress
 - Twisting stress
- 43 Which of the following is the main field of application of pin type insulator?
- Distribution system
 - Transmission system
 - Transmission and distribution system
 - EHV transmission system
- 44 Suspension type insulator are subjected to _____.
- tensile stress
 - compressive stress
 - tensile and compressive stress
 - depends on its use
- 45 A transmission line consists of 9 discs of suspension insulator in each string. What is the operating voltage of the transmission line?
- 11 KV
 - 33 KV
 - 66 KV
 - 132 KV
- 46 Suspension insulators are made up of_____.
- glass
 - porcelain
 - steatite
 - epoxy resin
- 47 Which of the following insulator is similar to pin type insulator?
- Suspension insulator
 - Post insulator

- c. Strain insulator
d. Shackle insulator
- 48 Which type of insulator is used where there is dead end of the line or there is a corner or a sharp curve, for high voltage line?
a. Pin type insulator
b. Shackle insulator
c. Strain insulator
d. Stay insulator
- 49 What is the most common cause of failure of overhead line insulators?
a. Flashover
b. Mechanical stress
c. Porosity of materials
d. Improper vitrification
- 50 Voltage distribution across disc of strings of suspension insulator assembly is_____.
a. same for all disks
b. maximum for unit nearest to the line
c. maximum for unit nearest to the tower
d. equal to transmission line voltage rating
- 51 The unequal voltage distribution across individual unit of string of suspension insulator is_____.
a. desirable and expressed by string efficiency
b. undesirable and expressed by string efficiency
c. desirable and expressed by impulse ratio
d. undesirable and expressed by impulse ratio
- 52 Glass insulator cannot be used for voltage above_____.
a. 25 KV
b. 11 KV
c. 33 KV
d. 50 KV
- 53 Which of the following location is suitable to use shackle insulator?
a. Sharp Turn in transmission line
b. Dead end of low voltage distribution line
c. For bearing High Voltage transmission line conductor
d. Dead end of EHV transmission line
- 54 Which of the following insulator is used for insulating stay wire from pole?
a. Pin type insulator
b. Shackle insulator
c. Suspension insulator
d. Stay insulator
- 55 What is the reason for unequal distribution of voltage among different unit of suspension insulator?
a. Unequal capacitance of different units
b. Unequal distribution of charging current caused by stray capacitance
c. Unequal resistivity of different units
d. Dirt deposited over the insulator disc
- 56 Arcing horns are used for_____.
a. protecting insulators from birds
b. protecting insulators from cracking or breaking due to flash over
c. improving string efficiency
d. protecting insulator from deposition of dirt
- 57 What is the effect of rain on string efficiency?
a. It becomes very low
b. It reduces slightly
c. It does not changes
d. It is improved
- 58 By using which of the following method hundred percent string efficiency can be achieved?
a. Using long cross arms
b. Capacitance grading
c. Static shielding
d. 100% string efficiency cannot be achieved

- 59 The factor which influences the arc deionization dominantly_____.
- line voltage
 - magnitude of transient fault current
 - speed of reclosure
 - all of the mentioned
- 60 A three phase transformer having a line voltage ratio of 400/33000 V is connected in the star-delta. The CTs on the 400V side have a CT ratio of 1000/5. What must be the ratio of CTs on the 33000 side?
- (7/5)
 - (5/7)
 - (3/5)
 - (5/2)
- 61 If a transformer is provided with differentially connected relay. To prevent the mal operation of the relay, the relay operating coil is biased with_____.
- 3rd harmonic
 - 2nd harmonic
 - 7th harmonic
 - 5th harmonic
- 62 If a transformer is provided with differentially connected relay. To prevent the mal operation of the relay, the relay restraining coil is biased with_____.
- 3rd harmonic
 - 2nd harmonic
 - 7th harmonic
 - 5th harmonic
- 63 The frequency of the carrier in the case of carrier-current-pilot scheme is in the range of_____.
- 50 kHz-500 kHz
 - 1 kHz-10 kHz
 - 25 kHz-50 kHz
 - 15 kHz-25kHz
- 64 A protection system engineer is planning to provide the complete protection, he can achieve this by _____.
- three phase fault relays and two earth fault relays
 - two phase fault relays and three earth fault relays
 - a two phase fault relays and three earth fault relays
 - a two phase fault relays and two earth fault relays
- 65 We need the biasing of differential relay biased to avoid mal operation when used for transformer protection due to_____.
- mismatch of CT
 - saturation of
 - difference in connection of both sides of CT
 - current setting mismatch
- 66 If the specified fault setting for a winding is mentioned as 20%, then what can be inferred about it?
- If a terminal fault has its current limited to the full load rating, then 20% of winding from neutral end will be unprotected
 - If a terminal fault has its current limited to the full load rating, then 80% of winding from neutral end will carry current
 - If a terminal fault has its voltage limited to the full load rating, then 20% of winding from neutral end will be unprotected
 - Any of the mentioned
- 67 Bias is used in the relay protection to_____.
- provide balanced sharing of current
 - reduce current level
 - divert the current
 - none of the mentioned
- 68 Unbalancing of an alternator may occur due to_____.
- single phase fault
 - unbalanced loading
 - line breaking
 - all of the mentioned

- 69 Which power plant has minimum operating cost?
- Hydroelectric power plant
 - Thermal power plant
 - Nuclear power plant
 - Gas Turbine Power Plant
- 70 Which of the following power plant have longest physical life?
- Thermal power plant
 - Nuclear power plant
 - Hydroelectric power plant
 - Diesel power plant
- 71 When load factor and diversity factor increases_____.
- cost of electricity decreases
 - cost of electricity also increases
 - cost of electricity remains same
 - cost of electricity increases exponential
- 72 The commercial sources of energy are_____.
- solar, wind and biomass
 - fossil fuels, hydropower and nuclear energy
 - wood, animal wastes and agriculture wastes
 - none of the above
- 73 In India largest thermal power station is located at_____.
- Kota
 - Sarni
 - Chandrapur
 - Neyveli
- 74 The percentage O_2 by Weight in atmospheric air is_____.
- 18%
 - 23%
 - 77%
 - 79%
- 75 The percentage O_2 by volume in atmosphere air is_____.
- 21%
 - 23%
 - 77%
 - 79%
- 76 The proper indication of incomplete combustion is_____.
- high CO content in flue gases at exit
 - high CO_2 content in flue gases at exit
 - high temperature of flue gases
 - the smoking exhaust from chimney
- 77 The main source of production of biogas is_____.
- human waste
 - wet cow dung
 - wet livestock waste
 - all above
- 78 India's first nuclear power plant was installed at_____.
- Tarapore
 - Kota
 - Kalpakkam
 - none of the above
- 79 In fuel cell, the_____energy is converted into electrical energy.
- mechanical
 - chemical
 - heat
 - sound
- 80 Solar thermal power generation can be achieved by_____.
- using focusing collector or heliostates
 - using flat plate collectors
 - using a solar pond
 - any of the above system
- 81 The energy radiated by sun on a bright sunny day is approximately_____.
- 700 W/m^2
 - 800 W/m^2
 - 1 kW/m^2
 - 2 kW/m^2
- 82 Thorium Breeder Reactors are most suitable for India because_____.
- these develop more power
 - its technology is simple
 - abundance of thorium deposits are available in India
 - these can be easily designed

- 83 The overall efficiency of thermal power plant is equal to_____.
- Rankine cycle efficiency
 - Carnot cycle efficiency
 - Regenerative cycle efficiency
 - Boiler efficiency x turbine efficiency x generator efficiency
- 84 Rankine cycle efficiency of a good steam power plant may be in the range of_____.
- 15 to 20 per cent
 - 35 to 45 per cent
 - 70 to 80 per cent
 - 90 to 95 per cent
- 85 Rankine efficiency of a steam power plant_____.
- improves in summer as compared to that in winter
 - improves in winter as compared to that in summer
 - is unaffected by climatic conditions
 - none of the above
- 86 Carnot cycle comprises of_____.
- two isentropic processes and two constant volume processes
 - two isentropic processes and two constant pressure processes
 - o isothermal processes and three constant pressure processes
 - none of the above
- 87 In Rankine cycle the work output from the turbine is given by_____.
- change of internal energy between inlet and outlet
 - change of enthalpy between inlet and outlet
 - change of entropy between inlet and outlet
 - change of temperature between inlet and outlet
- 88 Regenerative cycle thermal efficiency_____.
- is always greater than simple Rankine thermal efficiency
 - is greater than simple Rankine cycle thermal efficiency only when steam is bled at particular pressure
 - is same as simple Rankine cycle thermal efficiency
 - is always less than simple Rankine cycle thermal efficiency
- 89 In a regenerative feed heating cycle, the optimum value of the fraction of steam extracted for feed heating_____.
- decreases with increase in Rankine cycle efficiency
 - increases with increase in Rankine cycle efficiency
 - is unaffected by increase in Rankine cycle efficiency
 - none of the above
- 90 In a regenerative feed heating cycle, the greatest economy is affected_____.
- when steam is extracted from only one suitable point of steam turbine
 - when steam is extracted from several places in different stages of steam turbine
 - when steam is extracted only from the last stage of steam turbine
 - when steam is extracted only from the first stage of steam turbine
- 91 The maximum percentage gain in Regenerative feed heating cycle thermal efficiency
- increases with number of feed heaters increasing
 - decreases with number of feed heaters increasing
 - remains same unaffected by number of feed heaters
 - none of the above
- 92 In regenerative cycle feed water is heated by
- exhaust gases
 - heaters
 - draining steam from the turbine
 - all the above

- 93 Reheat cycle in steam power plant is used to_____.
- utilize heat of flue gases
 - increase thermal efficiency
 - improve condenser performance
 - reduce loss of heat
- 94 Mercury is a choice with steam in binary vapour cycle because it has_____.
- higher critical temperature and pressure
 - higher saturation temperature than other fluids
 - relatively low vapourisation pressure
 - all above
- 95 Binary's vapour cycles are used to_____.
- increase the performance of the condenser
 - increase the efficiency of the plant
 - increase efficiency of the turbine
- 96 A steam power station requires space_____.
- equal to diesel power station
 - more than diesel power station
 - less than diesel power station
 - equal to hydroelectric power station
- 97 Economizer is used to heat_____.
- air
 - feed water
 - flue gases
 - all above
- 98 The modern steam turbines are_____.
- impulse turbines
 - reaction turbines
 - impulse-reaction turbines
 - none of the above
- 99 The draught which a chimney produces is called_____.
- induced draught
 - natural draught
 - forced draught
 - balanced draught
- 100 The draught produced by steel chimney as compared to that produced by brick chimney for the same height is_____.
- less
 - more
 - same
 - may be more or less
- 101 In a boiler installation the natural draught is produced_____.
- due to the fact that furnace gases being light go through the chimney giving place to cold air from outside to rush in
 - due to the fact that pressure at the grate due to cold column is higher than the pressure at the chimney base due to hot column
 - due to the fact that at the chimney top the pressure is more than its environmental pressure
 - all of the above
- 102 The draught produced, for a given height of the chimney and given mean temperature of chimney gases_____.
- decreases with increase in outside air temperature
 - increases with increase in outside air temperature
 - remains the same irrespective of outside air temperature
 - may increase or decrease with increase in outside air temperature
- 103 The draught produced by chimney of given height at given outside temperature_____.
- decreases if the chimney gas temperature increases
 - increases if the chimney gas temperature increases
 - remains same irrespective of chimney gas temperature
 - may increase or decrease

- 104 For forced draught system, the function of chimney is mainly_____.
- to produce draught to accelerate the combustion of fuel
 - to discharge gases high up in the atmosphere to avoid hazard
 - to reduce the temperature of the hot gases discharged
 - none of the above
- 105 Artificial draught is produced by_____.
- induced fan
 - forced fan
 - induced and forced fan
 - all of the above
- 106 The draught in locomotive boilers is produced by_____.
- forced fan
 - chimney
 - steam jet
 - only motion of locomotive
- 107 For the same draught produced the power of induced draught fan as compared to forced draught fan is_____.
- less
 - more
 - same
 - not predictable
- 108 Artificial draught is produced by_____.
- air fans
 - steam jet
 - fan or steam jet
 - all of the above
- 109 The artificial draught normally is designed to produce_____.
- less smoke
 - more draught
 - less chimney gas temperature
 - all of the above
- 110 For the induced draught the fan is located_____.
- near bottom of chimney
 - near bottom of furnace
 - at the top of the chimney
 - anywhere permissible
- 111 The pressure at the furnace is minimum in case of_____.
- forced draught system
 - induced draught system
 - balanced draught system
 - natural draught system
- 112 The efficiency of chimney is approximately_____.
- 80%
 - 40%
 - 20%
 - 0.25%
- 113 The ratio of exit pressure to inlet pressure of maximum mass flow rate per area of steam through a nozzle when steam is initially superheated is_____.
- 0.555
 - 0.578
 - 0.5457
 - 0.6
- 114 The effect of considering friction losses in steam nozzle for the same pressure ratio leads to_____.
- increase in exit velocity from the nozzle
 - decrease in exit velocity from the nozzle
 - no change in exit velocity from the nozzle
 - increase or decrease depending upon the exit quality of steam
- 115 The effect of considering friction in steam nozzles for the same pressure ratio leads to_____.
- increase in dryness fraction of exit steam
 - decrease in dryness fraction of exit steam
 - no change in the quality of exit steam
 - decrease or increase of dryness fraction of exit steam depending upon inlet quality

- 116 In case of impulse steam turbine
- there is enthalpy drop in fixed and moving blades
 - there is enthalpy drop only in moving blades
 - there is enthalpy drop in nozzles
 - none of the above
- 117 Reheat factor in steam turbines depends on_____.
- exit pressure only
 - stage efficiency only
 - initial pressures and temperature only
 - all of the above
- 118 The value of reheat factor normally varies from_____.
- 0.5 to 0.6
 - 0.9 to 0.95
 - 1.02 to 1.06
 - 1.2 to 1.6
- 119 Steam turbines are governed by the following methods.
- Throttle governing
 - Nozzle control governing
 - By-pass governing
 - all of the above
- 120 In steam turbines the reheat factor_____.
- increases with the increase in number of stages
 - decreases with the increase in number of stages
 - remains same irrespective of number of stages
 - none of the above
- 121 The thermal efficiency of the engine with condenser as compared to without condenser, for a given pressure and temperature of steam, is_____.
- higher
 - lower
 - same as long as initial pressure and temperature is unchanged
 - none of the above
- 122 In jet type condensers_____.
- cooling water passes through tubes and steam surrounds them
 - steam passes through tubes and cooling water surrounds them
 - steam and cooling water mix
 - steam and cooling water do not mix
- 123 In a shell and tube surface condenser_____.
- steam and cooling water mix to give the condensate
 - cooling water passes through the tubes and steam surrounds them
 - steam passes through the cooling tubes and cooling water surrounds them
 - all of the above varying with situation
- 124 In a surface condenser if air is removed, there is_____.
- fall in absolute pressure maintained in condenser
 - rise in absolute pressure maintained in condenser
 - no change in absolute pressure in the condenser
 - rise in temperature of condensed steam
- 125 The cooling section in the surface condenser_____.
- increases the quantity of vapour extracted along with air
 - reduces the quantity of vapour extracted along with air
 - does not affect vapour quantity extracted but reduces pump capacity of air extraction pump
 - none of the above
- 126 Edward's air pump_____.
- removes air and also vapour from condenser
 - removes only air from condenser
 - removes only un-condensed vapour from condenser
 - removes air along with vapour and also the condensed water from condenser

- 127 In a steam power plant, the function of a condenser is_____.
- to maintain pressure below atmospheric to increase work output from the prime mover
 - to receive large volumes of steam exhausted from steam prime mover
 - to condense large volumes of steam to water which may be used again in boiler
 - all of the above
- 128 In a regenerative surface condenser,_____.
- there is one pump to remove air and condensate
 - there are two pumps to remove air and condensate
 - there are three pumps to remove air, vapour and condensate
 - there is no pump, the condensate gets removed by gravity
- 129 Evaporative type of condenser has_____.
- steam in pipes surrounded by water
 - water in pipes surrounded by steam
 - either (a) or (b)
 - none of the above
- 130 Pipes carrying steam are generally made up of_____.
- steel
 - cast iron
 - copper
 - aluminium
- 131 For the safety of a steam boiler the number of safety valves fitted are_____.
- four
 - three
 - two
 - one
- 132 Steam turbines commonly used in steam power station are_____.
- condensing type
 - non-condensing type
 - none of the above
- 133 Belt conveyer can be used to transport coal at inclinations up to_____.
- 30°
 - 60°
 - 80°
 - 90°
- 134 The maximum length of a screw conveyer is about_____.
- 30 metres
 - 40 metres
 - 60 metres
 - 100 metres
- 135 The efficiency of a modern boiler using coal and heat recovery equipment is about_____.
- 25 to 30%
 - 40 to 50%
 - 65 to 70%
 - 85 to 90%
- 136 The average ash content in Indian coals is about
- 5%
 - 10%
 - 15%
 - 20%
- 137 Load center in a power station is_____.
- center of coal fields
 - center of maximum load of equipments
 - center of gravity of electrical system
 - center of oil fields
- 138 Steam pressure in a steam power station, which is usually kept now-a-days is of the order of_____.
- 20 kgf/cm²
 - 50 kgf/cm²
 - 100 kgf/cm²
 - 150 kgf/cm²
- 139 Economizers improve boiler efficiency by_____.
- 1 to 5%
 - 4 to 10%
 - 10 to 12%

- d. 12 to 15%
- 140 The capacity of large turbo-generators varies from
- 20 to 100 MW
 - 50 to 300 MW
 - 70 to 400 MW
 - 100 to 650 MW
- 141 Caking coals are those which_____.
- burn completely
 - burn freely
 - do not form ash
 - form lumps or masses of coke
- 142 Primary air is that air which is used to_____.
- reduce the flame length
 - increase the flame length
 - transport and dry the coal
 - provide air around burners for getting optimum combustion
- 143 Secondary air is the air used to_____.
- reduce the flame length
 - increase the flame length
 - transport and dry the coal
 - provide air round the burners for getting optimum combustion
- 144 In coal preparation plant, magnetic separators are used to remove_____.
- dust
 - clinkers
 - iron particles
 - sand
- 145 Load carrying capacity of belt conveyor is about_____.
- 20 to 40 tons/hr
 - 50 to 100 tons/hr
 - 100 to 150 tons/hr
 - 150 to 200 tons/hr
- 146 Method which is commonly applied for unloading the coal for small power plant is_____.
- lift trucks
 - coal accelerators
 - tower cranes
 - belt conveyor
- 147 Bucket elevators are used for_____.
- carrying coal in horizontal direction
 - carrying coal in vertical direction
 - carrying coal in any direction
 - none of the above
- 148 The amount of air which is supplied for complete combustion is called_____.
- primary air
 - secondary air
 - tertiary air
 - natural air
- 149 In_____system fuel from a central pulverizing unit is delivered to a bunker and then to the various burners.
- unit
 - central
 - power
 - none of the above
- 150 Under-feed stokers work best for coals high in volatile matter and with caking tendency
- anthracite
 - lignite
 - semi bituminous and bituminous
 - none of the above
- 151 Traveling grate stoker can burn coals at the rates of_____.
- 50—75 kg/m² per hour
 - 5—100 kg/m² per hour
 - 100—150 kg/m² per hour
 - 150—200 kg/m² per hour
- 152 Blowing down of boiler water is the process_____.
- to reduce the boiler pressure
 - to increase the steam temperature
 - to control the solid concentration in the boiler water by removing some of the concentrated saline water
 - none of the above

- 153 Reheat factor is the ratio of_____.
- isentropic heat drop to useful heat drop
 - adiabatic heat drop to isentropic heat drop
 - cumulative actual enthalpy drop for the stages to total isentropic enthalpy heat drop
 - none of the above
- 154 The value of the reheat factor is of the order of_____.
- 0.8 to 1.0
 - 1.0 to 1.05
 - 1.1 to 1.5
 - above 1.5
- 155 Compounding of steam turbine is done for_____.
- reducing the work done
 - increasing the rotor speed
 - reducing the rotor speed
 - balancing the turbine
- 156 On which of the following routine tests are conducted?
- Oil circuit breakers
 - ir blast circuit breakers
 - Minimum oil circuit breakers
 - All of the above
- 157 SF₆ gas_____.
- is yellow in colour
 - is lighter than air
 - is nontoxic
 - has pungent smell
 - none of the above
- 158 The arcing contacts in a circuit breaker are made of_____.
- copper tungsten alloy
 - porcelain
 - electrolytic copper
 - aluminium alloy
- 159 Which of the following medium is employed for extinction of arc in air circuit breaker?
- Water
 - Oil
 - Air
 - SF₆
- 160 With which of the following, a circuit breaker must be equipped for remote operation?
- Inverse time trip
 - Time-delay trip
 - Shunt trip
 - None of the above
 - All of the above
- 161 Fault diverters are basically
- fuses
 - relays
 - fast switches
 - circuit breakers
- 162 A thermal protection switch can protect against
- short-circuit
 - temperature
 - overload
 - over voltage
- 163 Arc in a circuit behaves as_____.
- capacitive reactance
 - an inductive reactance
 - a resistance increasing with voltage rise across the arc
 - a resistance decreasing with voltage rise across the arc
- 164 Thermal circuit breaker has_____.
- delayed trip action
 - instantaneous trip action
 - both of the above
 - none of the above
- 165 Relays can be designed to respond to changes in_____.
- resistance, reactance or impedance
 - voltage and current
 - light intensity
 - temperature
 - all above
- 166 Overload relays are of_____ type.
- induction
 - solid state
 - thermal

- d. electromagnetic
e. all above
- 167 Thermal overload relays are used to protect the motor against over current due to_____.
- a. short-circuits
b. heavy loads
c. grounds
d. all of the above
- 168 Magnetic circuit breaker has_____ trip action.
- a. delayed
b. instantaneous
c. both of the above
d. none of the above
- 169 D.C. shunt relays are made of_____.
- a. few turns of thin wire
b. few turns of thick wire
c. many turns of thin wire
d. many turns of thick wire
- 170 The relay operating speed depends upon_____.
- a. the spring tension
b. the rate of flux built up
c. armature core air gap
d. all of the above
- 171 In order that current should flow without causing excessive heating or voltage drop, the relay contacts should_____.
- a. have low contact resistance
b. be clean and smooth
c. be of sufficient size and proper shape
d. have all above properties
- 172 Circuit breakers usually operate under_____.
- a. transient state of short-circuit current
b. sub-transient state of short-circuit current
c. steady state of short-circuit current
d. after D.C. component has ceased
- 173 Circuit breakers are essentially_____.
- a. current carrying contacts called electrodes
b. arc extinguishers
c. circuits to break the system
d. transformers to isolate the two systems
e. any of the above
- 174 The current zero interruption, in oil and air blast circuit breakers, is achieved by_____.
- a. lengthening of the gap
b. cooling and blast effect
c. both (a) and (b)
d. de-ionizing the oil with forced air
e. none of the above
- 175 Air blast circuit breaker is used for
- a. over currents
b. short duty
c. intermittent duty
d. repeated duty
- 176 An efficient and a well designed protective relaying should have _____.
- a. good selectivity and reliability
b. economy and simplicity
c. high speed and selectivity
d. all of the above
- 177 Burden of a protective relay is the power_____.
- a. required to operate the circuit breaker
b. absorbed by the circuit of relay
c. developed by the relay circuit
d. none of the above
- 178 Directional relays are based on flow of
- a. power
b. current
c. voltage wave
d. all of the above
- 179 A differential relay measures the vector difference between_____.
- a. two currents
b. two voltages
c. two or more similar electrical quantities

- d. none of the above
- 180 A transmission line is protected by_____.
- inrush protection
 - distance protection
 - time graded and current graded over current protection
 - both (b) and (c)
 - none of the above
- 181 Large internal faults are protected by_____.
- merze price percentage differential protection
 - mho and ohm relays
 - horn gaps and temperature relays
 - earth fault and positive sequence relays
- 182 When a transmission line is energized, the wave that propagates on it is_____.
- current wave only
 - voltage wave only
 - both (a) and (b)
 - power factor wave only
- 183 Protective relays are devices that detect abnormal conditions in electrical circuits by measuring_____.
- current during abnormal condition
 - voltage during abnormal condition
 - constantly the electrical quantities which differ during normal and abnormal conditions
 - none of the above
- 184 The voltage appearing across the contacts after opening of the circuit breaker is called_____voltage.
- recovery
 - surge
 - operating
 - arc
 - none of the above
- 185 Ionization in circuit breaker is facilitated by_____.
- high temperature
 - increase of mean free path
 - increasing field strength
 - all of the above
- 186 In a circuit breaker the basic problem is to_____.
- maintain the arc
 - extinguish the arc
 - transmit large power
 - emit the ionizing electrons
- 187 Overheating of relay contacts or contact born out is due to_____.
- slow making and breaking of load circuit contacts
 - foreign matter on the contact surface
 - too low contact pressure
 - all of the above
- 188 Interruption of large currents by relay requires_____.
- arc suppressing blow out coils
 - wide separation of the opened contacts
 - high speed opening of contacts
 - all of the above
- 189 Shunt capacitance is neglected while considering_____.
- short transmission line
 - medium transmission line
 - long transmission line
 - medium and long transmission lines
- 190 The arc voltage produced in A.C. circuit breaker is always_____.
- in phase with the arc current
 - lagging the arc current by 90°
 - leading the arc current by 90°
 - none of the above
- 191 The time of closing the cycle, in modern circuit breakers is_____.
- 0.003 sec
 - 0.001 sec
 - 0.01 sec
 - 0.10 sec
 - none of the above
- 192 Insulation resistance of high voltage circuit breakers is more than_____.

- a. 1 mega ohms
b. 10 mega ohms
c. 100 mega ohms
d. 500 mega ohms
- 193 Schering bridge is used to measure_____.
- a. resistance
b. frequency
c. input voltage
d. capacitance and its power factor
- 194 The dielectric loss of a capacitor can be measured by_____.
- a. Wien bridge
b. Owen bridge
c. Schering bridge
d. Maxwell bridge
- 195 Hay's bridge_____.
- a. is particularly suited for measurement of capacitance over a wide range of values
b. is particularly suited for measurement of inductance having high Q-value
c. is suited for measurement of capacitance having high Q-value
d. is suited for measurement of inductance having low Q-value
- 196 Power of 6-phase circuit can be measured with minimum of_____.
- a. two wattmeters
b. three wattmeters
c. four wattmeters
d. five wattmeters
- 197 Self balancing potentiometers are used_____.
- a. for industrial instruments
b. for vibration instruments
c. for experimental purposes in the laboratories
d. in recorders
- 198 Power factor meters have_____.
- a. only current coil
b. only voltage coils
c. both current and voltage coil
d. only inductive voltage coil
- 199 The ratio error in current transformer is due to_____.
- a. power factor of primary
b. watt-less component of current in the primary
c. exciting current
d. leakage flux
- 200 In a Wheatstone bridge, known resistances are correct to within +/- 0.2%. The accuracy to which an unknown resistance can be measured is_____.
- a. (+/-) 0.2%
b. (+/-) 0.4%
c. (+/-) 06%
d. (+/-) 0.8%
- 201 Inductance is measured in terms of capacitance and resistance by using
- a. Schering bridge
b. Anderson bridge
c. Maxwell-Wien bridge
d. Wien bridge
- 202 Which of the following bridges is used to measure inductance of a low-Q inductor?
- a. Maxwell bridge
b. Hay's bridge
c. Wien bridge
d. Anderson bridge
- 203 Which of the following instruments is the best choice to measure the potential difference of about 0.5 volt, the current being 20 μ A?
- a. Multi-meter
b. Rectifier type meter
c. VTVM
d. Potentiometer
- 204 Megger is an instrument for
- a. measuring current
b. measuring voltage
c. testing insulation
d. measuring power
- 205 The degree of mechanical vibrations produced by the laminations of a

- transformer depends on_____.
- tightness of clamping
 - gauge of laminations
 - size of laminations
 - all of the above
- 206 The no-load current drawn by transformer is usually what per cent of the full- load current?
- 0.2 to 0.5 per cent
 - 2 to 5 per cent
 - 12 to 15 per cent
 - 20 to 30 per cent
- 207 Sumpner's test is conducted on trans-formers to determine_____.
- temperature
 - stray losses
 - all-day efficiency
 - none of the above
- 208 No-load current in a transformer_____.
- lags behind the voltage by about 75°
 - leads the voltage by about 75°
 - lags behind the voltage by about 15°
 - leads the voltage by about 15°
- 209 While conducting short-circuit test on a transformer the following side is short circuited
- High voltage side
 - Low voltage side
 - Primary side
 - Secondary side
- 210 In the transformer following winding has got more cross-sectional area_____.
- Low voltage winding
 - High voltage winding
 - Primary winding
 - Secondary winding
- 211 A transformer cannot raise or lower the voltage of a D.C. supply because
- there is no need to change the D.C. voltage
 - a D.C. circuit has more losses
 - Faraday's laws of electromagnetic induction are not valid since the rate of change of flux is zero
 - none of the above
- 212 A common method of cooling a power transformer is_____.
- natural air cooling
 - air blast cooling
 - oil cooling
 - any of the above
- 213 In a transformer routine efficiency depends upon_____.
- supply frequency
 - load current
 - power factor of load
 - both (b) and (c)
- 214 In the transformer the function of a conservator is to_____.
- provide fresh air for cooling the transformer
 - supply cooling oil to transformer in time of need
 - protect the transformer from damage when oil expands due to heating
 - none of the above
- 215 Natural oil cooling is used for transformers up to a rating of
- 3000 kVA
 - 1000 kVA
 - 500 kVA
 - 250 kVA
- 216 Spacers are provided between adjacent coils_____.
- to provide free passage to the cooling oil
 - to insulate the coils from each other
 - both (a) and (b)
 - none of the above
- 217 The chemical used in breather for transformer should have the quality of_____.
- ionizing air
 - absorbing moisture
 - cleansing the transformer oil
 - cooling the transformer oil

- 218 The transformer ratings are usually expressed in terms of_____.
- volts
 - amperes
 - kW
 - kVA
- 219 Hysteresis loss in a transformer varies as_____. (B_{\max} = maximum flux density)
- B_{\max}
 - B_{\max}^{1-6}
 - B_{\max}^{1-83}
 - B_{\max}
- 220 Material used for construction of transformer core is usually_____.
- wood
 - copper
 - aluminium
 - silicon steel
- 221 In a transformer the resistance between its primary and secondary is_____.
- zero
 - 1 ohm
 - 1000 ohms
 - infinite
- 222 Delta/star transformer works satisfactorily when_____.
- load is balanced only
 - load is unbalanced only
 - on balanced as well as unbalanced loads
 - none of the above
- 223 The magnetizing current of a transformer is usually small because it has_____.
- small air gap
 - large leakage flux
 - laminated silicon steel core
 - fewer rotating parts
- 224 Which of the following does not change in an ordinary transformer?
- Frequency
 - Voltage
 - Current
 - Any of the above
- 225 Which of the following properties is not necessarily desirable for the material for transformer core?
- Low hysteresis loss
 - High permeability
 - High thermal conductivity
 - Adequate mechanical strength
- 226 The leakage flux in a transformer depends upon_____.
- load current
 - load current and voltage
 - load current, voltage and frequency
 - load current, voltage, frequency and power factor
- 227 The path of the magnetic flux in transformer should have_____.
- high reluctance
 - low reactance
 - high resistance
 - low resistance
- 228 Which of the following is not a routine test on transformers?
- Core insulation voltage test
 - Impedance test
 - Radio interference test
 - Polarity test
- 229 The core used in high frequency transformer is usually_____.
- copper core
 - cost iron core
 - air core
 - mild steel core
- 230 The full-load copper loss of a transformer is 1600 W. At half-load, the copper losses will be_____.
- 6400 W
 - 1600 W
 - 800 W
 - 400 W

- 231 The value of flux involved in the e.m.f. equation of a transformer is _____.
- average value
 - r.m.s. value
 - maximum value
 - instantaneous value
- 232 During short circuit test iron losses are negligible because _____.
- the current on secondary side is negligible
 - the voltage on secondary side does not vary
 - the voltage applied on primary side is low
 - full-load current is not supplied to the transformer
- 233 Two transformers are connected in parallel. These transformers do not have equal percentage impedance. This is likely to result in _____.
- short-circuiting of the secondary
 - power factor of one of the transformers is leading while that of the other lagging
 - transformers having higher copper losses will have negligible core losses
 - loading of the transformers not in proportion to their kVA ratings
- 234 The change in volume of transformer cooling oil due to variation of atmospheric temperature during day and night is taken care of by which part of transformer?
- Conservator
 - Breather
 - Bushings
 - Buchholz relay
- 235 In an actual transformer the iron loss remains practically constant from no-load to full load because _____.
- value of transformation ratio remains constant
 - permeability of transformer core remains constant
 - core flux remains practically constant
 - primary voltage remains constant
 - secondary voltage remains constant
- 236 If the supply frequency to the transformer is increased, the iron loss will _____.
- not change
 - decrease
 - increase
 - any of the above
- 237 Negative voltage regulation is indicative that the load is _____.
- capacitive only
 - inductive only
 - inductive or resistive
 - none of the above
- 238 When secondary of a current transformer is open-circuited its iron core will be _____.
- hot because of heavy iron losses taking place in it due to high flux density
 - hot because primary will carry heavy current
 - cool as there is no secondary current
 - none of above
- 239 The transformer laminations are insulated from each other by _____.
- mica strip
 - thin coat of varnish
 - paper
 - any of the above
- 240 Which type of winding is used in 3phase shell-type transformer?
- Circular type
 - Sandwich type
 - Cylindrical type
 - Rectangular type
- 241 During open circuit test of a transformer

- a. primary is supplied rated voltage
 b. primary is supplied full-load current
 c. primary is supplied current at reduced voltage
 d. primary is supplied rated kVA
- 242 Open circuit test on transformers is conducted to determine_____.
- a. hysteresis losses
 b. copper losses
 c. core losses
 d. eddy current losses
- 243 For the parallel operation of single phase transformers it is necessary that they should have_____.
- a. same efficiency
 b. same polarity
 c. same kVA rating
 d. same number of turns on the secondary side
- 244 The transformer oil should have_____volatility and_____viscosity.
- a. low, low
 b. high, high
 c. low, high
 d. high, low
- 245 Natural air cooling is generally restricted for transformers up to_____.
- a. 1.5 MVA
 b. 5 MVA
 c. 15 MVA
 d. 50 MVA
- 246 Which of the following is not the standard voltage for power supply in India?
- a. 11kV
 b. 33kV
 c. 66 kV
 d. 122 kV
- 247 For given applied voltage, with the increase in frequency of the applied voltage_____.
- a. eddy current loss will decrease
 b. eddy current loss will increase
- c. eddy current loss will remain unchanged
 d. none of the above
- 248 Losses which occur in rotating electric machines and do not occur in transformers are_____.
- a. friction and windage losses
 b. magnetic losses
 c. hysteresis and eddy current losses
 d. copper losses
- 249 Which of the following statements regarding an idel single-phase transformer having a turn ratio of 1 : 2 and drawing a current of 10 A from 200 V A.C. supply is incorrect ?
- a. Its secondary current is 5 A
 b. Its secondary voltage is 400 V
 c. Its rating is 2 kVA
 d. Its secondary current is 20 A
 e. It is a step-up transformer
- 250 The secondary of a current transformer is always short-circuited under operating conditions because it
- a. avoids core saturation and high voltage induction
 b. is safe to human beings
 c. protects the primary circuit
 d. none of the above
- 251 Which of the following protection is normally not provided on small distribution transformers?
- a. Over fluxing protection
 b. Buchholz relay
 c. Over current protection
 d. All of the above
- 252 The noise produced by a transformer is termed as_____.
- a. zoom
 b. hum
 c. ringing
 d. buzz
- 253 The hum in a transformer is mainly attributed to_____.
- a. load changes

- b. oil in the transformer
c. magnetostriction
d. mechanical vibrations
- 254 Which of the following could be lamina-proximately the thickness of laminations of a D.C. machine?
a. 0.005 mm
b. 0.05 mm
c. 0.5 m
d. 5 m
- 255 The commutator segments are connected to the armature conductors by means of_____.
a. copper lugs
b. resistance wires
c. insulation pads
d. brazing
- 256 According to Fleming's right-hand rule for finding the direction of induced e.m.f., when middle finger points in the direction of induced e.m.f., forefinger will point in the direction of_____.
a. motion of conductor
b. lines of force
c. either of the above
d. none of the above
- 257 While applying Fleming's right-hand rule to And the direction of induced e.m.f., the thumb points towards_____.
a. direction of induced e.m.f.
b. direction of flux
c. direction of motion of the conductor if forefinger points in the direction of generated e.m.f.
d. direction of motion of conductor, if forefinger points along the lines of flux
- 258 For a D.C. generator when the number of poles and the number of armature conductors is fixed, then which winding will give the higher e.m.f.?
a. Lap winding
- b. Wave winding
c. Either of (a) and (b) above
d. Depends on other features of design
- 259 The material for commutator brushes is generally_____.
a. mica
b. copper
c. cast iron
d. carbon
- 260 In D.C. generators, the brushes on commutator remain in contact with conductors' which_____.
a. lie under south pole
b. lie under north pole
c. lie under inter polar region
d. are farthest from the poles
- 261 Armature reaction of an unsaturated D.C. machine is_____.
a. cross-magnetizing
b. demagnetizing
c. magnetizing
d. none of above
- 262 For a D.C. machines laboratory following type of D.C. supply will be suitable_____.
a. rotary converter
b. mercury are rectifier
c. induction motor D.C. generator set
d. synchronous motor D.C. generator set
- 263 The number of brushes in a commutator depends on_____.
a. speed of armature
b. type of winding
c. voltage
d. amount of current to be collected
- 264 Which of the following components of a D.C, generator plays vital role for providing direct current of a D.C. generator?
a. Dummy coils
b. Commutator
c. Eye bolt
d. Equalizer rings

- 265 Two generators A and B have 6-poles each. Generator A has wave wound armature while generator B has lap wound armature. The ratio of the induced e.m.f. is generator A and B will be_____.
- 02:03
 - 03:01
 - 03:02
 - 01:03
- 266 The voltage drop for which of the following types of brush can be expected to be least?
- Graphite brushes
 - Carbon brushes
 - Metal graphite brushes
 - None of the above
- 267 The e.m.f. generated by a shunt wound D.C. generator is E. Now while pole flux remains constant, if the speed of the generator is doubled, the e.m.f. generated will be_____.
- $E/2$
 - $2E$
 - slightly less than E
 - E
- 268 In a D.C. generator in order to reduce sparking at brushes, the self-induced e.m.f. in the coil is neutralized by all of the following except_____.
- Inter poles
 - dummy coils
 - compensating winding
 - shifting of axis of brushes
- 269 Flashing the field of D.C. generator means_____.
- neutralizing residual magnetism
 - creating residual magnetism by a D.C. source
 - making the magnetic losses of forces parallel
 - increasing flux density by adding extra turns of windings on poles
- 270 To achieve spark-less commutation brushes of a D.C. generator are placed ahead so as to bring them_____.
- just ahead of magnetic neutral axis
 - in magnetic neutral axis
 - just behind the magnetic neutral axis
 - none of the above
- 271 Armature coil is short circuited by brushes when it lies_____.
- along neutral axis
 - along field axis
 - in any of the above positions
 - in none of the above positions
- 272 In case of a flat compounded generator_____.
- voltage generated is less than the rated voltage
 - generated voltage is proportional to the load on the generator
 - voltage remains constant irrespective of the load
 - speed varies in proportion to the load on the generator
- 273 If residual magnetism is present in a D.C. generator, the induced e.m.f. at zero speed will be_____.
- zero
 - small
 - the same as rated voltage
 - high
- 274 The terminal voltage of a series generator is 150 V when the load current is 5A. If the load current is increased to 10 A, the terminal voltage will be_____.
- 150 V
 - less than 150 V
 - greater than 150 V
 - none of the above
- 275 The essential condition for parallel operation of two D.C. generators is that they have_____.
- same kW rating
 - the same operation r.p.m.

- c. the same drooping voltage characteristics
d. same percentage regulation
- 276 With a D.C. generator which of the following regulation is preferred?
a. 100% regulation
b. infinite regulation
c. 50% regulation
d. 1% regulation
- 277 Which generator would you prefer for feeding long D.C. transmission lines?
a. Series generator
b. Shunt generator
c. Over compound generator
d. Flat compound generator
- 278 In a D.C. generator the critical resistance can be increased by_____.
a. increasing its field resistance
b. decreasing its field resistance
c. increasing its speed
d. decreasing its speed
- 279 The series field of a short-shunt D.C. generator is excited by_____.
a. external current
b. armature current
c. shunt current
d. load current
- 280 The direction of rotation of a D.C. series motor can be changed by_____.
a. interchanging supply terminals
b. interchanging field terminals
c. either of (a) and (b) above
d. None of the above
- 281 If a D.C. motor is to be selected for conveyors, which motor would be preferred?
a. Series motor
b. Shunt motor
c. Differentially compound motor
d. Cumulative compound motor
- 282 Which D.C. motor is preferred for elevators?
a. Shunt motor
b. Series motor
c. Differential compound motor
d. Cumulative compound motor
- 283 According to Fleming's left-hand rule, when the forefinger points in the direction of the field or flux, the middle finger will point in the direction of_____.
a. current in the conductor
b. voltage of conductor
c. resultant force on conductor
d. none of the above
- 284 If the field of a D.C. shunt motors gets opened while motor is running_____.
a. the speed of motor will be reduced %
b. the armature current will reduce
c. the motor will attain dangerously high speed
d. the motor will continue to run at constant speed
- 285 Starters are used with D.C. motors because_____.
a. these motors have high starting torque
b. these motors are not self-starting
c. back e.m.f. of these motors is zero initially
d. to restrict armature current as there is no back e.m.f. while starting
- 286 A direct on line starter is used: for starting motors_____.
a. up to 5 H.P.
b. up to 10 H.P.
c. up to 15 H.P.
d. up to 20 H.P.
- 287 What will happen if the back e.m.f. of a D.C. motor vanishes suddenly?
a. The motor will stop
b. The motor will continue to run
c. The armature may burn
d. The motor will run noisy

- 288 In case of D.C. shunt motors the speed is dependent on back e.m.f. only because_____.
- back e.m.f. is equal to armature drop
 - armature drop is negligible
 - flux is proportional to armature current
 - flux is practically constant in D.C. shunt motors
- 289 The ratio of starting torque to full-load torque is least in case of_____.
- series motors
 - shunt motors
 - compound motors
 - none of the above
- 290 In D.C. motor which of the following can sustain the maximum temperature rise?
- Slip rings
 - Commutator
 - Field winding
 - Armature winding
- 291 Which of the following law/rule can be used to determine the direction of rotation of D.C. motor?
- Lenz's law
 - Faraday's law
 - Coulomb's law
 - Fleming's left-hand rule
- 292 The starting resistance of a D.C. motor is generally
- low
 - around 500 Ω
 - 1000 Ω
 - infinitely large
- 293 The speed of a D.C. series motor is_____.
- proportional to the armature current
 - proportional to the square of the armature current
 - proportional to field current
 - inversely proportional to the armature current
- 294 In a D.C. series motor, if the armature current is reduced by 50%, the torque of the motor will be equal to_____.
- 100% of the previous value
 - 50% of the previous value
 - 25% of the previous value
 - 10% of the previous value
 - none of the above
- 295 Which D.C. motor will be suitable along with flywheel for intermittent light and heavy loads?
- Series motor
 - Shunt motor
 - Cumulatively compounded motor
 - Differentially compounded motor
- 296 D.C. series motors are used_____.
- where load is constant
 - where load changes frequently
 - where constant operating speed is needed
 - in none of the above situations
- 297 If the supply voltage for a D.C. motor is increased, which of the following will decrease?
- Starting torque
 - Operating speed
 - Full-load current
 - All of the above
- 298 Which one of the following is not the function of pole shoes in a D.C. machine?
- To reduce eddy current loss
 - To support the field coils
 - To spread out flux for better uniformity
 - To reduce the reluctance of the magnetic path
- 299 The condition for maximum power in case of D.C. motor is_____.
- back e.m.f. = 2 x supply voltage
 - back e.m.f. = $\frac{1}{2}$ x supply voltage
 - supply voltage = $\sqrt{2}$ x back e.m.f.
 - supply voltage = back e.m.f.

- 300 Which D.C. motor is generally preferred for cranes and hoists?
- Series motor
 - Shunt motor
 - Cumulatively compounded motor
 - Differentially compounded motor
- 301 Sparking is discouraged in a D.C. motor because_____.
- it increases the input power consumption
 - commutator gets damaged
 - both (a) and (b)
 - none of the above
- 302 Flywheel is used with D.C. compound motor to reduce the peak demand by the motor, compound motor will have to be_____.
- level compounded
 - under compounded
 - cumulatively compounded
 - differentially compounded
- 303 Following motor is used where high starting torque and wide speed range control is required.
- Single phase capacitor start
 - Induction motor
 - Synchronous motor
 - D.C. motor
 - none of the above
- 304 In a differentially compounded D.C. motor, if shunt field suddenly opens_____.
- the motor will first stop and then run in opposite direction as series motor
 - the motor will work as series motor and run at slow speed in the same direction
 - the motor will work as series motor and run at high speed in the same direction
 - the motor will not work and come to stop
- 305 Which of the following motor has the poorest speed regulation?
- Shunt motor
 - Series motor
 - Differential compound motor
 - Cumulative compound motor
- 306 Which of the following method of speed control of D.C. machine will offer minimum efficiency?
- Voltage control method
 - Field control method
 - Armature control method
 - All above methods
- 307 The speed of a motor falls from 1100 r.p.m. at no-load to 1050 r.p.m. at rated load. The speed regulation of the motor is_____.
- 2.36%
 - 4.76%
 - 6.77%
 - 8.84%
- 308 As there is no back e.m.f. at the instant of starting a D.C. motor, in order to prevent a heavy current from flowing though the armature circuit_____.
- a resistance is connected in series with armature
 - a resistance is connected parallel to the armature
 - armature is temporarily open circuited
 - a high value resistor is connected across the field winding
- 309 If I_2 be the armature current, then speed of a D.C. shunt motor is_____.
- independent of I_a
 - proportional to I_a
 - varies as $1/(I_a)$
 - varies as I_a
- 310 At the instant of starting when a D.C. motor is put on supply, it behaves like_____.
- a highly resistive circuit
 - a low resistance circuit
 - a capacitive circuit
 - none of the above

- 311 If a D.C. motor designed for 40°C ambient temperature is to be used for 50°C ambient temperature, then the motor_____.
- of lower H.P. should be selected
 - of higher H.P. should be selected
 - can be used for 50°C ambient temperature also
 - is to be derated by a factor recommended by manufacturer and select the next higher H.P. motor
- 312 If the terminals of armature of D.C. motor are interchanged, this action will offer following kind of braking_____.
- regenerative
 - plugging
 - dynamic braking
 - none of the above
 - any of the above
- 313 For constant torque drive which speed control method is preferred?
- Field control
 - Armature voltage control
 - Shunt armature control
 - Mechanical loading system
- 314 The hysteresis loss in a D.C. machine least depends on_____.
- Frequency of magnetic reversals
 - Maximum value of flux density
 - Volume and grade of iron
 - Rate of flow of ventilating air
- 315 The losses occurring in a D.C. generator are given below. Which loss is likely to have highest proportion at rated load of the generator?
- hysteresis loss
 - field copper loss
 - armature copper loss
 - eddy current loss
- 316 Torque developed by a D.C. motor depends upon_____.
- magnetic field
 - active length of the conductor & radius of armature
 - current flow through the conductors
 - number of conductors
 - l above factors
- 317 D.C. shunt motors are used for driving_____.
- trains
 - cranes
 - hoists
 - machine tools
- 318 Which of the following loss in a D.C. generator is dissipated in the form of heat?
- Mechanical loss
 - Core loss
 - Copper loss
 - All of the above
- 319 Which of the following losses are significantly reduced by laminating the core of a D.C. generator?
- Hysteresis losses
 - Eddy current losses
 - Copper losses
 - Windage losses
- 320 D.C. generators are installed near the load centers to reduce_____.
- iron losses
 - line losses
 - sparking
 - corona losses
- 321 Which method of braking is generally used in elevators?
- Plugging
 - Regenerative braking
 - Rheostatic braking
 - None of the above
- 322 When the armature of a D.C. motor rotates, e.m.f. induced is_____.
- self-induced e.m.f.
 - mutually induced e.m.f.
 - back e.m.f.
 - none of the above
- 323 Where D.C. motor of H.P. 12 or more requires frequent starting, stopping, reversing and speed control?

- a. drum type controller is used
 b. three point starter is used
 c. four point starter is used
 d. all above can be used
- 324 If a D.C. shunt motor is working at full load and if shunt field circuit suddenly opens_____.
- a. this will make armature to take heavy current, possibly burning it
 b. this will result in excessive speed, possibly destroying armature due to excessive centrifugal stresses
 c. nothing will happen to motor
 d. motor will come to stop
- 325 D.C. motor is to a drive a load which is almost nil for certain part of the load cycle and peak value for short duration. We will select the_____.
- a. series motor
 b. shunt motor
 c. compound motor
 d. any of the above
- 326 Which D.C. motor has got maximum self relieving property?
- a. Series motor
 b. Shunt motor
 c. Cumulatively compounded motor
 d. Differentially compounded motor
- 327 One D.C. motor drives another D.C. motor. The second D.C. motor when excited and driven_____.
- a. runs as a generator
 b. does not run as a generator
 c. also runs as a motor comes to stop after sometime
- 328 Low voltage circuit breakers have rated voltage of less than_____.
- a. 220 V
 b. 400 V
 c. 1000 V
 d. 10,000 V
- 329 The fault clearing time of a circuit breaker is usually_____.
- a. few minutes
 b. few seconds
 c. one second
 d. few cycles of supply voltage
- 330 When a HVAC circuit breaker is tested for endurance, it is tested for at least_____.
- a. 1000 opening-closing operations
 b. 100 opening -closing operations
 c. 10 opening -closing operations
 d. 5 opening-closing operations
- 331 For high voltage ac circuit breakers, the rated short circuit current is passed for_____.
- a. 0.01 seconds
 b. 0.1 seconds
 c. 3 seconds
 d. 30 seconds
- 332 SF₆ gas is_____.
- a. yellow in color
 b. has pungent odor
 c. is highly toxic
 d. non-inflammable
- 333 The pressure of SF₆ gas in circuit breakers is of the order of_____.
- a. 100 mm Hg
 b. 1 kg/cm²
 c. 3 to 5 kg/cm²
 d. 30 to 50 kg/cm²
- 334 SF₆ gas_____.
- a. is lighter than hydrogen
 b. is lighter than air
 c. has density 2 times as compared to that of air
 d. has density 5 times as compared to that of air
- 335 In a vacuum circuit breaker, the vacuum is of the order of
- a. 10 mm Hg
 b. 10⁻² mm Hg
 c. 10⁻⁶ mm Hg
 d. 10⁻⁹ mm Hg

- 336 In a HRC fuse the time between cut-off and final current zero is known as _____.
- total operating time
 - arcing time
 - pre-arcing time
 - any of the above
- 337 Fusing factor of a HRC fuse is _____.
- Minimum fusing current/Current rating
 - Minimum fusing current/Minimum rupturing time
 - Maximum fusing current/Minimum fusing current
 - Minimum fusing current/Prospective current of a circuit
- 338 Under normal conditions, a circuit breaker should be inspected?
- every day
 - every week
 - once in 6 months or 12 months
 - once in 6 years to 7 years
- 339 The contact resistance of a circuit breaker is of the order of _____.
- 20 micro ohms \pm 10
 - 20 milli ohms \pm 10
 - 20 ohms \pm 10
 - 200 ohms \pm 10
- 340 The insulation resistance of a high voltage circuit breaker is _____.
- 1 k Ω
 - 10 k Ω
 - 20 Mega ohms
 - 2000 Mega ohms
- 341 In a circuit breaker if the insulation resistance between phase terminal and earthed frame is less than the specified limit, the probable cause could be _____.
- moisture
 - dirty insulation surface
 - carbon or copper particles sticking to the internal surface
 - any of the above.
- 342 The normal frequency RMS voltage that appears across the breaker poles after final arc extinction has occurred, is _____.
- recovery voltage
 - Re-striking voltage
 - supply voltage
 - peak voltage
- 343 The transient voltage that appears across the contacts at the instant of arc extinction is called _____.
- recovery voltage
 - Re-striking voltage
 - supply voltage
 - peak voltage
- 344 In a circuit breaker the active recovery voltages depends upon _____.
- power factor
 - armature reaction
 - circuit conditions
 - all of the above
- 345 A fuse wire posses _____.
- inverse time characteristics
 - direct time characteristics
 - neither of the above
- 346 Fuse protection is used for current ratings up to _____.
- 10 A
 - 20 A
 - 50 A
 - 100 A
- 347 The fuse current in amperes is related with fuse wire diameter D as _____.
- $I \propto 1/D$
 - $I \propto D$
 - $I \propto D^{3/2}$
 - $I \propto D^2$
- 348 A fuse wire should have _____.
- low specific resistance and high melting point

- b. low specific resistance and low melting point
 c. high specific resistance and high melting point
 d. high specific resistance and low melting point
- 349 The number of cycles in which a high speed circuit breaker can complete its operation is_____.
- a. 3 to 8
 b. 10 to 18
 c. 20 to 30
 d. 40 to 50
- 350 For extra high voltage lines which circuit breaker is preferred?
- a. Bulk oil circuit breaker
 b. Vacuum circuit breaker
 c. SF₆ circuit breaker
 d. Minimum oil circuit breaker
- 351 A material best suited for manufacturing of fuse wire is_____.
- a. Aluminum
 b. Silver
 c. Lead
 d. Copper
- 352 In a circuit breaker the current which exists at the instant of contact separation is known as_____.
- a. Re-striking current
 b. breaking current
 c. surge current
 d. recovery current
- 353 Breaking capacity of a circuit breaker is usually expressed in terms of_____.
- a. Amperes
 b. Volts
 c. MW
 d. MVA
- 354 The contact resistance is least affected by_____.
- a. the mechanical force applied
 b. the shape of the contact faces
 c. the amount of surface contamination
 d. the ambient temperature
- 355 As the force on contact is increased, the contact resistance will_____.
- a. increase linearly
 b. increase exponentially
 c. remain unchanged
 d. decrease
- 356 Minimum arcing voltage for platinum is 16 V. It can therefore be concluded that when the voltage is below 16 V,_____.
- a. it will not possible to interrupt the circuit
 b. it will not possible to pass the current
 c. it will be possible to interrupt any value of current without arcing
 d. it will be possible to interrupt any value of current without bringing contact closer to each other.
- 357 The arc voltage produced in the circuit breaker is always_____.
- a. in phase with arc current
 b. leading the arcing current by 90 degrees
 c. lagging the arcing current by 90 degrees
- 358 Sparking between contacts can be reduced by_____.
- a. inserting a resistance in the line
 b. inserting a capacitor in series with the contacts
 c. inserting a capacitor in parallel with the contacts
- 359 For magnetic blow out of the arc, magnetic field is produced_____.
- a. in the load circuit
 b. parallel to the axis of the arc
 c. at right angles to the axis of the ar
- 360 Sparking occurs when a load is switched off because the circuit has_____.
- a. high inductance

- b. high capacitance
c. high resistance
- 361 The power factor of the arc in circuit breaker is _____.
- a. always zero
b. always unity
c. always lagging
d. always leading
- 362 Air blast circuit breaker is usually used for _____.
- a. instantaneous duty
b. permanent break
c. intermittent duty
d. repeated duty
- 363 Flame proof switch gears are usually preferred _____.
- a. on transmission lines of low voltage
b. substations
c. in mines
d. in high MVA capacity circuits
- 364 Pressure of air in air blast circuit breakers is usually _____.
- a. 1 to 5 kg/cm²
b. 5 to 10 kg/cm²
c. 10 to 30 kg/cm²
d. 35 to 100 kg/cm²
- 365 Air used in air blast circuit breaker _____.
- a. must have least carbon dioxide
b. must have ionized
c. must have oil mist
d. must be free from moisture
- 366 In a circuit breaker the time duration from the instant of fault to the instant of energizing of the trip coil is known as _____.
- a. lag time
b. lead time
c. protection time
d. operation time
- 367 In a circuit breaker the time duration from the instant of fault to the instant of extinction of arc is known as _____.
- a. lag time
b. lead time
c. total clearing time
d. operation time
- 368 In a circuit breaker the time duration from the instant of fault to the instant of closing of contact is known as _____.
- a. recycle time
b. total time
c. gross time
d. re-closing time
- 369 For a high speed circuit breaker the total clearing time is nearly _____.
- a. 1 to 2 cycles
b. 5 to 10 cycles
c. 10 to 15 cycles
d. less than 50 cycles
- 370 If the power factor is zero, the active recovery voltages will be _____.
- a. minimum
b. 0.5
c. 0.707
d. maximum
- 371 Which of the following circuit breaker will produce the least arc energy
- a. Minimum oil circuit breaker
b. Air blast circuit breaker
c. Plain oil circuit breaker
d. All will produce same energy.
- 372 For a circuit breaker 'break time' is _____.
- a. same as opening time
b. opening time + arc duration
c. opening time + arc duration + resistor current duration
- 373 The breaking capacity of a circuit breaker in MVA (3 phase) is given by _____.
- a. rated service voltage x rated symmetrical current
b. 1.1 x rated service voltage x rated symmetrical current

- c. $\sqrt{2}$ x rated service voltage x rated symmetrical current
d. $\sqrt{3}$ x rated service voltage x rated symmetrical current
- 374 Which relay is used for feeders?
a. MHO relay
b. Translay relay
c. Merz Piece Protection
d. Buchholz relay
- 375 MHO relay is used for_____.
a. rectifiers
b. circuit breakers
c. transmission lines
d. feeders
- 376 Merz Piece protection is used on_____.
a. substations
b. capacitor banks
c. induction motors
d. generators
- 377 The advantage of neutral earthing is_____.
a. simplified design of earth fault protection
b. over-voltage due to lightning can be discharged to the earth
c. freedom from persistent arcing ground
d. all of the above
- 378 The protection against over-voltage due to lightning is provided by_____.
a. use of surge diverters
b. low tower footing resistance
c. use of over head ground wires
d. any of the above
- 379 Which of the following is a conducting medium for electric current?
a. low temperature gas
b. high temperature gas
c. dissociated gas
d. plasma
- 380 In circuit breakers the contact space is ionized by_____.
a. thermal ionization of gas
b. thermal emission from the surface of contacts
c. field emission from the surface of contacts
d. any of the above
- 381 Which of the following statement about SF₆ gas is incorrect?
a. it is a non-toxic gas
b. it is non-inflammable
c. it has density 5 times that of air at 20°C
d. it has dark yellow color
- 382 SF₆ gas is transported in_____.
a. gas cylinders
b. liquid form in cylinders
c. solid form in boxes
d. air cylinders
- 383 During arc extinction SF₆ gas_____.
a. decomposes into S and F ions
b. decomposes into SF₄ and SF₂
c. gets oxidized
d. reduces to SF₃
- 384 Dielectric strength of SF₆ is
a. less than that of air at atmospheric pressure
b. less than that of used in OCB
c. more than that of used in OCB
d. more at lower pressure and low at higher pressure
- 385 Which of the following is demerit of SF₆ circuit breaker?
a. sealing problem of gas
b. in flux of moisture in the gas system is dangerous
c. deterioration of quality of circuit breaker affects reliability of circuit breaker
d. all of the above
- 386 Sphere gaps are used for_____.
a. measurement of high DC voltages
b. measurement of high AC voltages
c. measurement of impulse voltages
d. all of the above.

- 387 Which of the following is not valid in case of aluminum as compared to copper? Aluminum has higher_____.
- resistivity
 - coefficient of linear expansion
 - tensile strength
 - joint resistance
- 388 The isolator is interlocked with circuit breaker and earthing switch. While opening the circuit, _____opens first, then the_____and only after this _____can close.
- isolator, circuit breaker, earthing switch
 - earthing switch, isolator, circuit breaker
 - circuit breaker, earthing switch, isolator
 - circuit breaker, isolator, earthing switch
- 389 Which of the following are the voltage waves of magnitude higher than the desirable value?
- over-voltages
 - surges
 - transients
 - all of the above
- 390 Over voltage transients may occur due to_____.
- lightening
 - switching
 - arcing grounds
 - any of the above
- 391 Surge impedance of overhead transmission line is of the order of_____.
- 20 to 30 ohms
 - 300 to 500 ohms
 - 3000 to 5000 ohms
 - 30 K Ω to 300 K Ω
- 392 The surge impedance of underground cable is of the order of_____.
- 20 to 60 ohms
 - 200 to 600 ohms
 - 2000 to 3000 ohms
 - 30 K Ω to 300 K Ω
- 393 The surge impedance of a transmission line is given by_____.
- \sqrt{LC}
 - $\sqrt{L/C}$
 - $\sqrt{C/L}$
 - $\sqrt{L+C}$
- 394 Surge modifiers are used to_____.
- reduce the current of wave front
 - reduce the voltage of wave front
 - reduce the steepness of wave front
 - modify the shape of wave front
- 395 The steepness of the wave front can be reduced by_____.
- connecting a capacitance between line and earth
 - connecting an inductor in series with the line
 - connecting an capacitor between line and earth or connecting an inductor in series with the line
 - connecting an inductor between line and earth and connecting a capacitor in series with the line
- 396 The disadvantage offered by ungrounded system is_____.
- frequent arcing grounds
 - difficult earth fault relying
 - voltage oscillations
 - all of the above
- 397 Solid grounding is used for voltages_____.
- above 220 kV
 - above 11 kV
 - below 660 V
 - below 115 V
- 398 Resistance grounding is used for voltages_____.
- below 220 V
 - Up to 660 V
 - between 3.3 kV to 11 kV
 - above 66 kV

- 399 Switchover voltages are more hazardous than lightning surges in case of_____.
- low voltage systems
 - 11 kV systems
 - unbalanced systems
 - EHV and UHV systems.
- 400 Current limiting reactors may be_____.
- air cooled, air cored
 - oil immersed magnetically shielded
 - oil immersed non-magnetically shielded
 - any of the above
- 401 Series reactors are installed at strategic locations of power system to_____.
- bring down the fault current level within the capacity of switchgear
 - directly pass the fault surges to the ground
 - pass neutralizing surges of opposite nature
 - discharge the capacitors
- 402 Fault diverters_____.
- divert the current to the earth in the event of short-circuits
 - neutralize the surges by resistors
 - modify the surge wave shapes
 - none of the above
- 403 In star connected system without neutral grounding, zero sequence currents are_____.
- same as the peak value of phase currents
 - same as the RMS value of phase currents
 - vector sum of the phase currents
 - zero
- 404 In which portion of the transmission system faults occur most frequently?
- transformers
 - overhead lines
 - alternators
 - underground cables
- 405 Which portion of the transmission system is least prone to faults?
- switchgear
 - CT, PT
 - alternators
 - feeders
- 406 A 3 phase, 5000 kVA, 6.6 kV generators having 12% sub-transient reactance.A3-phase short-circuit occurs at its terminals. Fault MVA is_____.
- 21.5
 - 41.66
 - 53.33
 - 75.75
- 407 A 3 phase, 5000 kVA, 6.6 kV generators having 12% sub-transient reactance.A3-phase short-circuit occurs at its terminals. Fault current is_____.
- 3640 A
 - 2460 A
 - 1680 A
 - 880 A
- 408 The ohmic value of impedance to be connected in the neutral to ground circuit of a 2000 kVA transformer with earth fault relay set to 40% with respect to400 V side will be_____.
- 0.2 ohm
 - 2.0 ohm
 - 20 ohm
 - 200 ohms
- 409 Within the boiler, the steam has highest temperature in_____.
- water tubes
 - super-heater
 - water walls
 - water drum
- 410 Which of the following enters the super-heater?
- Superheated steam.
 - Wet steam.
 - Hot water.
 - Cold water.

- 411 Superheated steam is always_____.
- at a pressure more than that of the boiler steam
 - at a pressure lower than the maximum cycle pressure
 - at a temperature higher than the temperature of saturation corresponding to the steam pressure
 - none of the above
- 412 Steam is superheated in order to_____.
- improve Rankine cycle efficiency
 - reduce initial condensation losses
 - avoid too high temperature in the last stage of the turbine
 - all of the above
- 413 The function of the economizer is to_____.
- heat up the incoming water with exhaust steam
 - heat up the pulverized fuel by exhaust gases.
 - heat up the incoming air by exhaust gases.
 - heat up the incoming water by exhaust gases.
- 414 The main function of economizer of a boiler plant is to_____.
- increase steam production
 - reduce fuel consumption
 - increase steam pressure
 - increase life of the boiler
- 415 In a steam power plant heat from the flue gases is recovered in_____.
- a condenser
 - a chimney
 - economizer and air preheat
 - a de-super-heater
- 416 Economizer in a steam power plant_____.
- improves the boiler efficiency by 10-12%
 - saves fuel consumption by 5-15%
 - becomes a necessity for pressure exceeding 70 kg/cm^2
 - all of the above
- 417 The advantage of reheating of steam in a turbine is that_____.
- it increases the efficiency of the turbine
 - it reduces the wears on the blades
 - it increases the work-done through the turbine
 - all of the above advantages
- 418 Air pre-heater in a steam power plant_____.
- recovers the heat from the flue gases leaving the economizer
 - improves combustion rate
 - raises the temperature of the furnace gases
 - all of the above
- 419 Condensers in thermal power plants are for condensing_____.
- steam to water
 - water to ice
 - hydrogen gas to liquid gas
 - carbon dioxide to dry ice
- 420 A condenser in a steam power plant condenses steam coming out of_____.
- turbine
 - boiler
 - economizer
 - super-heater
- 421 In a steam power plant water is used for cooling purposes in_____.
- economizer
 - condenser
 - super-heater
 - electrostatic precipitator
- 422 In a steam turbine cycle, the lowest pressure occurs in_____.
- condenser
 - turbine inlet
 - boiler
 - super-heater

- 423 Increase in condenser back pressure will lead to_____.
- loss
 - gain
 - none of these
- 424 In which part of the thermal power plant, the steam pressure is less than that of atmosphere?
- Boiler
 - Turbine
 - Super-heater
 - Condenser
- 425 The major function of the condenser is to_____.
- remove the condensate for boiler feed water
 - condense steam
 - reduce the back pressure so that maximum heat energy can be extracted from steam
 - provide a closed cycle
- 426 The function of a condenser in a steam power plant is to_____.
- condense the large volume of steam to water to be used as boiler feed water
 - receive the large volume of steam exhausted from the steam turbine
 - maintain pressure below atmospheric so that maximum heat energy can be extracted from steam
 - all of the above
- 427 Evaporative type of condenser has_____.
- steam in pipes surrounded by water
 - water in pipes surrounded by steam outside
 - steam and cooling water mixed to give condensate
 - none of the above
- 428 In a jet type condenser_____.
- steam passes through tubes and cooling water surrounds them
 - water passes through tubes and steam surrounds them
 - steam and cooling water mix
 - none of the above
- 429 In a shell and tube surface condenser_____.
- steam passes through the tubes and cooling water surrounds them
 - cooling water passes through the tubes and steam surrounds them
 - steam and water mix to give condensate
 - none of the above
- 430 In a regenerative surface condenser_____.
- there is no pump to remove condensate and the condensate gets removed by gravity
 - there is only one pump for removing air and condensate
 - there are two pumps to remove air and condensate
 - there are three pumps to remove air, condensate and vapor
- 431 In a surface condenser, on removal of air_____.
- absolute pressure of condenser is reduce
 - absolute pressure of condenser is increase
 - absolute pressure of condenser remains unaffected
 - temperature of condensed steam is increase
- 432 The purpose of the boiler feed pump is to_____.
- pump hot air into the boiler
 - pump pulverized coal into the boiler
 - pump out steam from the boiler
 - pump water into the boiler
 - none of the above
- 433 The function of air pumps in a condenser is to_____.
- remove water
 - air leaking into the condenser and maintain vacuum
 - maintain atmospheric pressure in the condenser
 - both (a) and (b)

- 434 Wet air pump is to remove_____.
- condensate only
 - air only
 - both air and condensate
 - vapor from the condenser
- 435 In a steam power plant cooling towers are used for_____.
- cooling condenser outlet water
 - cooling exhaust steam
 - cooling feed water
 - all of the above
- 436 Spray ponds are used for cooling warm water coming out of condenser in_____.
- large power plants
 - medium power plants
 - small power plants
 - both in medium and large power plants
- 437 The drawback (s) of spray ponds is /are_____.
- large ground area is required especially in case of large sized power plants
 - loss of water due to evaporation
 - considerable quantity of water is carried away in air when its velocity is high
 - all of the above
- 438 In which of the following steam turbines the back pressure will be below the atmospheric one?
- Non-condensing turbine
 - Condensing turbine
 - Topping turbine
 - None of the above
- 439 The modern steam turbines are_____.
- reaction turbines
 - impulse turbines
 - impulse reaction turbines
 - none of the above
- 440 In case of reaction steam turbine_____.
- there is a enthalpy drop both in fixed and moving blades
 - there is enthalpy drop only in moving blades
 - there is enthalpy drop only in fixed blades
 - none of the above
- 441 As compared to steam at entry to the turbine which of the following will be larger at exit?
- Flow rate
 - Pressure
 - Specific volume
 - Specific enthalpy
- 442 For the same power, the size of a turbine_____.
- increases with speed
 - remains with speed
 - decrease with speed
- 443 The pressure on the two sides of the impulse wheel of a steam turbine_____.
- is different
 - is the same
 - reduces from one side to the other side
 - increases form one side to the other side
- 444 Reheat factor in steam turbines depends on_____.
- stage efficiency
 - exit pressure
 - initial pressure and temperature
 - all of the above
- 445 In steam turbines, the reheat factor_____.
- increases with the increase in number of stages
 - reduces with the increase in number of stages
 - remains the same irrespective of number of stages
 - none of the above

- 446 The value of reheat factor for a multistage steam turbine lies in the range of_____.
- 1.005 to 1.03
 - 1.01 to 1.06
 - 1.02 to 1.1
 - 1.10 to 1.2
- 447 Steam turbines are governed by_____.
- nozzle control governing
 - throttle governing
 - bypass governing
 - all of the above
- 448 Topping turbines are_____.
- low pressure condensing ones
 - high pressure condensing ones
 - high pressure non-condensing ones
 - low pressure non-condensing ones
- 449 Compounding of steam turbines is done in order to_____.
- reduce the rotor speed
 - increase the rotor speed
 - balance the turbine
 - none of the above
- 450 The governing employed for medium and larger sized steam turbines is_____.
- bypass
 - nozzle
 - throttle
 - combination of (a) and (b)
- 451 The ratio of exit pressure to inlet pressure of maximum mass flow rate per unit area of steam through a nozzle, when the steam is initially super heated, is_____.
- 0.65
 - 0.578
 - 0.5457
 - 0.5325
- 452 The ratio of exit pressure to inlet pressure of maximum mass flow rate per unit area of steam through a nozzle, when the steam is initially dry saturated, is_____.
- 0.5325
 - 0.5457
 - 0.578
 - 0.65
- 453 The effect of considering friction in steam nozzles for the same pressure ratio leads to_____.
- increase in dryness fraction of exit steam
 - decrease in exit velocity from the nozzle
 - no change in exit velocity from the nozzle and quality of exit steam
 - both (a) and (b)
- 454 The steam is superheated to the highest economical temperature in order to_____.
- reduce the requirement of steam for a given output of energy owing to its high internal energy and thus reduce the turbine size
 - reduce the mechanical resistance to the flow of steam over turbine blades and increase the efficiency as superheated steam is dry and so turbine blades remain dry
 - avoid corrosion and pitting at the turbine blades occurring owing to steam dryness
 - all of the above
- 455 Any leakage of air into the condenser destroys the vacuum and causes_____.
- an increase in air pressure in the condenser limiting the useful heat drop in the steam turbine
 - lowering of the partial pressure of the steam and of the saturation temperature along with it
 - under-cooling of the condensate more severe
 - all of the above
- 456 A 200 MW steam power plant will consume nearly_____tons of coal per day.
- 1000
 - 2000
 - 4000

- d. 7500
- 457 Heating value of coal is roughly_____.
- 1,000 - 1,500 kcal/kg
 - 3,000 - 4,500 kcal/kg
 - 5,000 - 6,500 kcal/kg
 - 7,500 - 10,000 kcal/kg
- 458 Calorific value of coal largely depends upon_____.
- ash content
 - size of coal particles
 - moisture content
 - volatile matter
- 459 The coal of the lowest calorific value is_____.
- anthracite
 - bituminous coal
 - lignite
 - steam coal
- 460 The coal having highest calorific value is_____.
- anthracite
 - bituminous
 - lignite
 - peat
- 461 Coal used in thermal power plants is also known as_____.
- soft coal
 - steam coal
 - charcoal
 - coke
- 462 Coking coles_____.
- do not form ash
 - burn completely
 - form lumps or masses of coke
 - burn freely
- 463 Which of the following is considered to be superior quality of coal?
- Bituminous.
 - Coke.
 - Lignite.
 - Peat
- 464 Low grade coals have_____.
- low carbon content
 - low calorific value
 - low moisture content
 - low ash content
- 465 Coal is usually considered of_____.
- lava origin
 - animal origin
 - vegetable origin
 - none of the above
- 466 Coal rank classifies coal as per its_____.
- specific gravity
 - degree of metamorphism
 - carbon percentage
 - ash content
- 467 The average ash content in Indian coals is around_____.
- 5%.
 - 10%.
 - 20%.
 - 30%.
- 468 The coal that has highest ash content is_____.
- lignite
 - coking coal
 - bituminous coal
 - steam coal
- 469 Ash content of coal can be reduced by_____.
- pulverizing
 - washing
 - slow burning
 - mixing with high grade coal
- 470 Combustible elements in the fuel are_____.
- carbon and hydrogen
 - carbon, hydrogen and ash
 - carbon, hydrogen and sulphur
 - carbon, nitrogen and ash
- 471 The percentage of carbon in anthracites is usually_____.
- more than 90%
 - about 70%
 - about 50%
 - below 40%

- 472 Solvent refined coal has low percentage of _____.
 a. impurities
 b. sulphur
 c. ash
 d. all of the above
- 473 Presence of sulphur content in coal will cause _____.
 a. spontaneous combustion during coal storage and air heater corroding
 b. clinkering and slagging
 c. facilitating ash precipitation
 d. all of the above
- 474 Sulphur content of liquid fuels assumes importance from the point of view of _____.
 a. firing rate
 b. heating rate
 c. corrosion
 d. efficiency
- 475 Chemical composition of coal is given by _____.
 a. ultimate analysis
 b. proximate analysis
 c. gross analysis
 d. any of the above
- 476 Ultimate analysis of fuel determines the percentage of _____.
 a. ash, volatile matter and moisture
 b. total carbon by weight
 c. total carbon by weight – unit weight of H₂, O₂, N₂, sulphur and ash
 d. none of the above
- 477 Complete combustion of pulverized coal in a steam raising thermal power plant is ensured by what type of an analysis of flue gas going out by the chimney?
 a. O₂ content for given air intake.
 b. CO₂ content for given fuel rate fee
 c. CO content
 d. All of these
- 478 The proximate analysis of coal gives percentage by weight of _____.
 a. moisture, and volatile matter
 b. moisture, volatile matter, fixed carbon and ash
 c. carbon, hydrogen, oxygen, nitrogen, sulphur and ash
 d. carbon, hydrogen, and oxygen
- 479 The ash content of bituminous coal is _____.
 a. 2 to 3%
 b. 6 to 12%
 c. 15 to 20%
- 480 The most important factors to be considered in the selection of fuel for power plants include
 a. cost of fuel
 b. calorific value of fuel
 c. none of the above
 d. both (a) and (b)
- 481 Live storage of coal in power plant means _____.
 a. a covered storage near the boiler furnace having coal sufficient to meet 24 hour demand of the power plant
 b. coal in transit
 c. coal ready for combustion
 d. storage of coal sufficient to meet one week demand of the plant readily
- 482 In a steam power plant, coal is carried from storage to boiler generally by means of _____.
 a. trolleys
 b. V-belts
 c. buckets
 d. manually
- 483 Belt conveyors can be employed for transporting coal at inclination up to _____.
 a. 75°
 b. 60°
 c. 30°
 d. 15°
- 484 The maximum length of a screw conveyor is around _____.
 a. 85 - 90%

- b. 40 - 60%
c. 60 - 75%
d. 15 - 30%
- 485 In small power plants, coal is unloaded by means of_____.
- a. belt conveyors
b. coal accelerators
c. lift trucks
d. all of the above
- 486 Load carrying capacity of a belt conveyor is around_____.
- a. 10 - 20 tonnes per hour
b. 20 - 40 tonnes per hour
c. 50 - 100 tonnes per hour
d. 100 - 160 tonnes per hour
- 487 Bucket elevators are employed for_____.
- a. carrying coal in vertical direction
b. carrying coal in horizontal direction
c. carrying coal in any direction
d. none of the above
- 488 In coal preparation plants, the magnetic separation is used for removing_____.
- a. dust
b. iron particles
c. clinkers
d. all of the above
- 489 Burning of low grade fuel can be improved by_____.
- a. pulverizing
b. blending with better quality coals
c. oil assisted ignition
d. any of the above
- 490 Which one is essential for combustion of fuel?
- a. Oxygen
b. Correct fuel-air ratio
c. Proper ignition temperature
d. All of the above three
- 491 The percentage of O₂ in atmospheric air is_____.
- a. 21 % by volume
b. 23 % by weight
c. 79 % by volume and 77% by weight
- d. both (a) and (b)
- 492 The proper indication of incomplete combustion is_____.
- a. the smoking exhaust from chimney
b. high temperature of flue gas
c. high CO content in flue gases at exit
d. high CO₂ content in flue gases at exit
- 493 The stoker used in large capacity boilers, when un- pulverized coal is used, is_____.
- a. overfeed stoker
b. underfeed stoker
c. any of the above
d. none of the above
- 494 Over feed stoker includes_____.
- a. travelling grate
b. chain grate
c. spreader
d. all of the above
- 495 The equipment used for supplying coal to the boiler, when un- pulverized coal is being used, is_____.
- a. skip hoist
b. stoker
c. any of the above
d. none of the above
- 496 Capacity of the underfeed stoker is in the range of_____coal burned per hour.
- a. 100 — 250 kg
b. 100 — 500 kg
c. 100 — 2,000 kg
d. 100 — 5,000 kg
- 497 Travelling grate stoker can burn coal at the rate of_____.
- a. 50 to 75 kg/m²h
b. 75 to 100 kg/m²h
c. 100 to 150 kg/m²h
d. 150 to 200 kg/m²h
- 498 Pulverized coal is_____.
- a. non-smoking coal
b. coal free from ash
c. coal broken in fine particles

- d. coal which burns for long time
- 499 Equipment used for pulverizing the coal is the_____.
- hopper
 - stoker
 - ball mill
 - burner
- 500 Pulverized fuel is used for_____.
- better burning
 - increased calorific value of coal
 - less radiation loss
 - medium size units
- 501 The advantages of using pulverized fuel include_____.
- higher boiler efficiency, low air requirement and low fan power
 - easy and complete combustion
 - fast response to load changes and low banking losses
 - all of the above
- 502 The drawbacks of using pulverized fuel include_____.
- additional investment in pulverizing plant and stack fly-ash removal equipment
 - extra power requirements for the pulverizing plant
 - reduced power plant efficiency
 - both (a) and (b)
- 503 Ash is the main waste product of steam power plants with low grade coal (may be in tonnes per day). This ash_____.
- can be used in building construction
 - can be used in brick making near the plant side
 - it can be dumped in disused mines, river or sea or in an area excavated in the waste land, as the case may be
 - all of the above
- 504 Fly-ash generally results from_____.
- fluidized bed boilers
 - pulverized coal boilers
 - diesel engines
 - gas turbines
- 505 Dust can be separated from gas by_____.
- impingement upon small baffles
 - sudden velocity decrease owing to enlargement
 - abrupt changes of flow direction
 - any of the above
- 506 Which of the following equipment is installed in steam power plants to reduce air pollution?
- De-super-heater.
 - Air filter.
 - Air electrostatic precipitator.
 - Stack.
 - None of the above
- 507 In coal-fired thermal power stations, what are the electrostatic precipitators used for?
- To remove dust particles settling on the bus bar conductors in the station switchyard
 - To condense steam by electrostatic means.
 - To keep the air heaters clean.
 - To collect the dust particles from the flue gases.
- 508 Electrostatic precipitator is installed between_____.
- induced fan and chimney
 - air pre-heater and induced fan
 - economizer and air pre-heater
 - boiler furnace and economizer
- 509 The draught produced by a chimney is called the_____.
- forced draught
 - induced draught
 - natural draught
 - balanced draught
- 510 The draught produced by steel chimney in comparison to that produced by brick chimney, for the same height, is_____.
- more
 - less

- c. the same
d. unpredictable
- 511 Artificial draught is produced by_____.
- a forced fan
 - an induced fan
 - induced and forced fan
 - all of the above
- 512 For the same draught produced the power of forced draught fan, in comparison to that of induced draught fan, is_____.
- more
 - less
 - the same
 - may be more or less
- 513 The artificial draught is usually designed to produce_____.
- more draught
 - less smoke
 - low temperature of chimney gas
 - all of the above
- 514 The draught produced by a chimney of a given height at a given outside temperature_____.
- decreases with the increase in temperature of chimney gases
 - increases with the increase in temperature of chimney gases
 - remains unchanged irrespective of temperature of chimney gases
 - may increase or decrease
- 515 The natural draught_____.
- is provided by a chimney
 - is used in small steam boilers
 - can also be used in large steam boilers if economizers and pre-heaters have been use
 - both (a) and (b)
- 516 The magnitude of natural draught depends upon_____.
- average temperature difference between flue gases within the chimney and the outside air
 - height of the chimney above the furnace grate level
- c. weather and operating conditions
d. all of the above
- 517 For forced draught the blower is located_____.
- at the top of the chimney
 - near the base of the chimney
 - near the base of the boiler
 - any where permissible
- 518 The height of chimney in a steam power station is governed by_____.
- the draught to be produce
 - the quantity of flue gases being produce
 - pollution control
 - all of the above
- 519 The pressure at the furnace is minimum in case of_____.
- induced draught
 - forced draught
 - balanced draught
 - natural draught
- 520 In forced draught the main function of the chimney is to_____.
- discharge gases high up in the atmosphere from the point of view of air pollution
 - accelerate the fuel combustion
 - reduce the temperature of the discharged hot gases
 - all of the above
- 521 Induced draught fans amused to_____.
- cool the steam let out by the turbine in thermal station
 - cool the hot gases coming out of the boiler
 - force the air inside the coal furnace
 - control the heat generated in a nuclear reactor
 - pull the gas out of the chimney
- 522 What it the nominal pH value of water that is to be maintained in a steam raising thermal power station?
- 0

- b. 7
c. 8.5
d. 14.3
- 523 The feed water treatment is done mainly to avoid_____.
- embrittlement problem
 - carry over problem
 - corrosion and scale formation problems
 - all of the above problems
- 524 Boiling down of boiler water is done so as to_____.
- control the solid concentration in the boiler water by removing some of the concentrated saline water
 - remove dissolved gases in the water
 - reduce boiler pressure
 - increase steam temperature
- 525 It is necessary to heat water before feeding it back to the boiler as because of this_____.
- the dissolved oxygen and carbon dioxide which would other-wise corrode boiler are removed in the feed water heater
 - thermal stresses due to cold water entering the boiler drum are avoided
 - some other impurities carried by steam and condensate due to corrosion in boiler and condenser are precipitated outside the boiler
 - all of the above
- 526 Huge quantity of water is required in a steam power plant. It is required_____.
- to raise the steam in boilers
 - for cooling purposes such as in condensers
 - as a carrying medium such as in disposal of ash
 - all of the above
- 527 For a 3-element feed water control in a coal-fired thermal power station, measurements of level of water in the boiler drums is made so
- that the water level does not_____.
- exceed a specified upper limit
 - fall below a specified lower limit
 - violate specified upper and lower limits
 - restrict to a specified limit
- 528 The auxiliary consumption in a thermal power (steam) station is_____.
- 2 - 5%
 - 8 - 10%
 - 15 - 20%
 - 20 - 25%
- 529 Turbo-alternators run at_____.
- a variable speed around 2,000 rpm
 - a constant speed of 1,000 rpm
 - a constant speed of 3,000 rpm
 - a variable speed above 1,000 rpm
 - none of the above
- 530 Large size steam plants and nuclear plants are suitable for_____.
- peak loads
 - intermediate loads
 - base loads
 - both base and peak loads
- 531 The efficiency of a nuclear power plant is less than that of a conventional fuel fired thermal plant because of_____.
- less rejection of heat in the condenser
 - higher temperature conditions
 - higher pressure conditions
 - low temperature and pressure conditions
- 532 In ac distribution system the voltage can be controlled by using_____.
- tap changing transformer
 - booster transformer
 - induction regulator
 - any of the above
- 533 Tap changing transformers are employed for_____.
- stepping down the voltage

- b. stepping up the voltage
c. supplying low voltage current to instruments
d. both stepping up and stepping down the voltage
- 534 The best location for use of a booster transformer in a transmission line is _____.
- a. at the sending end
b. at the receiving end
c. at the intermediate point
d. anywhere in the line
- 535 For voltage control in ac distribution system the induction regulators have the advantage(s) of _____.
- a. reliability of operation
b. operation independent of load and power factor variations
c. step less voltage variations without acing or short-circuiting of turns as in the case of transformers
d. all of the above
- 536 A line voltage regulator is to be used in a single phase 200 V, 5 kVA system to keep the voltage constant for voltage variations within $\pm 10\%$. The rating (in kVA) of the voltage regulator is _____.
- a. 0.05
b. 0.5
c. 5
d. 50
- 537 Series capacitor is used in a transmission line to _____.
- a. compensate the voltage drop
b. reduce line losses
c. limit short-circuit current
d. improve load power factor
- 538 Shunt compensation in an EHV line is used to improve _____.
- a. stability and fault level
b. fault level and voltage profile
c. voltage profile and stability
d. stability, fault level and voltage profile
- 539 _____ are used to provide compensation at the receiving end of a transmission line so as to improve its voltage profile.
- a. Condensers.
b. Resistors.
c. Reactors.
d. Condensers, resistors or reactors.
- 540 The combined effect of series and shunt compensation on transmission lines in terms of degree of series compensation (K_{se}), degree of shunt compensation (K_{sh}), and surge impedance of uncompensated line (Z_o) is given by which one of the following equations?
- a. $Z'_o = Z_o \sqrt{(1 - K_{se})} \cdot \sqrt{(1 - K_{sh})}$
b. $Z'_o = [\sqrt{(1 - K_{se})} \cdot \sqrt{(1 - K_{sh})}] \div Z_o$
c. $Z'_o = Z_o [(1 - K_{se}) \div (1 - K_{sh})]^{1/2}$
d. $Z'_o = Z_o [(1 - K_{sh}) \div (1 - K_{se})]^{1/2}$
- 541 Consider the following statements:
Addition of lumped capacitances in parallel to a loss-free transmission line increases
1. characteristic impedance
2. propagation constant
3. system stability
4. charging current
Which of these statements are correct?
- a. 1 and 3
b. 2 and 4
c. 2, 3 and 4
d. 1, 2 and 4
- 542 What will happen if a short-circuit fault occurs in a switched capacitor controlled reactor?
- a. Oscillation
b. Capacitor discharge
c. Over voltage
d. Noise
- 543 An AC capacitor is to be switched in parallel with AC line using back to back connected thyristor. What is the firing angle of thyristor for first switching?

- a. 0°
 b. 180°
 c. 90°
 d. 45°
- 544 Which of the following is provided with arcing horns?
 a. Isolator.
 b. Air-break switch.
 c. Oil switch.
 d. None of the above.
- 545 Pole mounted substations are used in_____.
 a. primary transmission system
 b. secondary transmission system
 c. primary distribution system
 d. secondary distribution system
- 546 With large reactance inter connector between two power stations_____.
 a. the power stations may fall out of step due to large angular displacement between the power stations
 b. power will be transferred with minimum power losses
 c. power will be transferred with voltage fluctuations and noise
 d. none of the above
- 547 AC network analyzer is employed for solving the problems of_____.
 a. load flow
 b. load flow and stability
 c. load flow and short circuit
 d. load flow, stability and short circuit
- 548 Consider the following statements:
 Stability studies constitute
 1. The major analytical approach to the study of power system electromechanical dynamic behavior
 2. The involvement of one or just a few machines undergoing slow or gradual changes in operating conditions
 3. The determination of the locus of essentially steady-state operating points of the system
 4. The determination of whether or not the rotors of the machines being perturbed return to the constant speed operation.
 Which of the statements given above are correct?
 a. 1, 2 and 3.
 b. 2, 3 and 4.
 c. 1 and 4.
 d. 1, 2, 3 and 4.
- 549 Power system stability is defined as_____.
 a. that attribute of the system or part of the system which enables it to develop restoring forces between the elements there of equal or greater than disturbing forces so as to restore a state of equilibrium between the elements
 b. the maximum power flow possible through some particular point in the system when the entire or part of the system is disturbed
 c. both (a) and (b)
 d. neither (a) nor (b)
- 550 Stability limit of a power system is defined as
 a. that attribute of the system or part of the system which enables it to develop restoring forces between the elements there of equal or greater than disturbing forces so as to restore a state of equilibrium between the elements
 b. the maximum power flow possible through some particular point in the system when the entire or part of the system is disturbed
 c. both (a) and (b)
 d. neither (a) nor (b)
- 551 Steady-state stability of a power system is the ability of the power system to_____.
 a. maintain voltage at the rated voltage level
 b. maintain frequency exactly at 50 Hz
 c. maintain a spinning reserve margin at all times

- d. maintain synchronism between machines and on external tie lines
- 552 Transient disturbances are caused by_____.
- sudden load changes
 - switching operations
 - inadvertent tripping of lines and generators
 - faults in the power system
 - all of the above
- 553 Transient stability of a 3-phase power systems having more than one synchronous generator is not affected by which one of the following specifications?
- Initial operating conditions of generators
 - Quantum of large power disturbance
 - Fast fault clearance and re-closure
 - Small changes in system frequency
- 554 The power transmission capacity of a transmission line is_____.
- proportional to transmission voltage
 - proportional to the square of transmission voltage
 - inversely proportional to transmission voltage
 - inversely proportional to the square of transmission voltage
- 555 The load carrying capability of a long ac transmission line is_____.
- always limited by the conductor size
 - limited by stability considerations
 - reduced at low ambient temperatures
 - decreased by the use of bundled conductors of single conductors
- 556 Maximum power will be transferred from the sending end to the receiving end by a transmission line when_____.
- the line reactance is $\sqrt{3}$ times its resistance, i.e., $X = \sqrt{3}R$
 - the torque angle $\delta = 90^\circ$
 - both (a) and (b)
 - neither (a) nor (b)
- 557 The steady state stability limits for round rotor and salient pole 3-phase synchronous generator are attained at the values of power angle δ _____.
- $= \pi/2$, and $= \pi/2$, respectively
 - $< \pi/2$, and $< \pi/2$, respectively
 - $< \pi/2$, and $= \pi/2$, respectively
 - $= \pi/2$, and $< \pi/2$, respectively
- 558 Which one of the following statements is true?
- steady-state stability limit is greater than transient stability limit
 - steady-state stability limit is equal to transient stability limit
 - steady-state stability limit is less than the transient stability limit
 - no generalization can be made regarding the equality or other wise of the steady, state stability limit and transient stability limit
- 559 Steady-state stability of a power system is improved by_____.
- reducing fault clearing time
 - using double circuit line instead of single circuit line
 - single pole switching
 - decreasing generator inertia
- 560 The methods employed in improving the system stability are_____.
- increasing the system voltage only
 - reducing the transfer reactance only
 - using high-speed auto-reclosing circuit breaker only
 - using all together
- 561 Series capacitors are used to_____.
- compensate for line inductive reactance and improve the stability of the power system
 - improve the voltage
 - reduce fault level
 - improve the power factor
- 562 In a multi-machine interconnected system, subsequent to a 3-phase

- fault, the transient stability is examined by_____.
- equal-area criterion
 - solution of swing equation
 - either by equal-area criterion or by solution of swing equation
 - combination of equal-area criterion and solution of swing equation
- 563 The equal area criterion of stability is used for_____.
- no load on the bus-bar
 - one machine and infinite bus-bar
 - more than one machine and infinite bus-bar
 - none of the above
- 564 The 'equal area criterion' for the determination of transient stability of a synchronous machine connected to an infinite bus_____.
- ignores line as well as synchronous machine resistances and shunt capacitances
 - assumes accelerating power acting on the rotor as constant
 - ignores the effect of voltage regulator and governor but considers the inherent damping present in the machine
 - takes into consideration the possibility of machine losing synchronism after it has survived during the first swing
- 565 The 'Equal area criterion' for the determination of transient stability of the synchronous machine connected to an infinite bus:
- Ignores line as well as synchronous machine resistances and shunt capacitances.
 - Assumes accelerating power acting on the rotor as constant.
 - Ignores the effect of voltage regulator and governor but considers the inherent damping present in the machine.
 - Takes into consideration the possibility of machine losing synchronism after it has survived during the first swing.
- 566 For what value of damping parameter, the transient stability is assured by equal area criterion?
- Independent of systems damping.
 - If only damping is exactly zero.
 - For all values of damping parameters.
 - If only damping is positive and finite.
- 567 Equal area criterion gives the information regarding_____.
- stability region
 - absolute stability
 - relative stability
 - swing curves
- 568 The critical clearing time of a fault in power system is related to_____.
- reactive power limit
 - short-circuit limit
 - steady-state stability limit
 - transient stability limit
- 569 With fault clearing time, the transient stability limit of a power system_____.
- increases
 - decreases
 - first increases and then decreases
 - first decreases and then increases
- 570 For which one of the following types of motors, is the equal-area criterion for stability applicable?
- Three phase synchronous motor.
 - Three-phase induction motor.
 - DC series motor.
 - DC compound motor.
- 571 The inertia constants of two groups of machines which do not swing together are M_1 and M_2 such that $M_1 > M_2$. It is proposed to add some inertia to one of the two groups of machines for improving the

- transient stability of the system. It should be added to_____.
- M_1
 - M_2
 - either to M_1 or to M_2
 - neither of the above
- 572 The transient stability limit of a power system can be appreciably increased by introducing_____.
- series inductance
 - shunt inductance
 - series capacitance
 - shunt capacitance
- 573 Consider the following statements:
The transient stability of the power system under unbalanced fault condition can be effectively improved by
- excitation control
 - phase shifting transformer
 - single-pole switching of circuit breakers
 - increasing the turbine input
- Of these statements_____.
- 1 and 2 are correct.
 - 2 and 3 are correct.
 - 3 and 4 are correct.
 - 1 and 3 are correct.
- 574 The use of high speed circuit breakers_____.
- improves transient stability
 - decreases transient stability
 - has no effect on system stability
- 575 The use of fast acting relays and circuit breakers for clearing a sudden short-circuit on a transmission line between a generator and the receiving end bus improves the transient stability of the machine because the_____.
- short-circuit current becomes zero
 - post-fault transfer impedance attains a value higher than that during the fault
 - ordinate of the post-fault power-angle characteristic is higher than that of during fault characteristic
 - voltage behind the transient reactance increases to a high
- 576 Load flow study is carried out for_____.
- load-frequency control
 - planning of power system
 - fault calculations
 - study of stability of the system
- 577 Load flow studies must be made on a power system before_____.
- making short-circuit studies but not for transient stability studies of the power system
 - making transient stability studies but not for short-circuit studies on the power system
 - making both short-circuit and transient stability studies on the power system
 - for neither making short-circuit studies nor transient stability studies on the power system
- 578 Load flow studies involve solving simultaneous_____.
- linear algebraic equations
 - non-linear algebraic equations
 - linear differential equations
 - nonlinear differential equations
- 579 In a power system, each bus or node is associated with four quantities, namely. 1. Real power. 2. Reactive power. 3. bus-voltage magnitude. 4. Phase angle of the bus voltage. For load-flow solution, among these four, the number of quantities to be specified is_____.
- any one
 - any two
 - any three
 - all the four
- 580 Consider the following quantities: 1. Real power 2. Reactive power 3. Power factor 4. Input current 5. Bus

- voltage magnitude 6. Bus voltage phase-angle.
For the purpose of the load flow studies of a power system, each bus or node is associated with which one of the combinations of the above four quantities?
- 1, 3, 4 and 5
 - 1, 2, 3 and 4
 - 2, 3, 5 and 6
 - 1, 2, 5 and 6
- 581 In load flow studies of a power system, a voltage control bus is specified by :
- Real power and reactive power.
 - Reactive power and voltage magnitude.
 - Voltage and voltage phase angle.
 - Real power and voltage magnitude.
- 582 For a load-flow solution the quantities normally specified at a voltage controlled bus are_____.
- P and Q
 - P and $|V|$
 - Q and $|V|$
 - P and δ .
- 583 Load bus is specified by_____.
- P and V.
 - P and δ .
 - P and $|V|$.
 - P and Q.
- 584 At slacks bus, which one of the following combinations of variables is specified? (The symbols have their usual meaning)
- $|V|$, δ
 - P, Q
 - P, $|V|$
 - Q, $|V|$
- 585 In a power system, the maximum number of buses are_____.
- generator buses
 - load buses
 - slack buses
 - P-V buses
- 586 If a voltage controlled bus is treated as a load bus, then which one of the following limits would be violated?
- Voltage.
 - Active power.
 - Reactive power.
 - Phase angle.
- 587 In load-flow analysis, the load connected at a bus is represented as_____.
- constant current drawn from the bus
 - constant impedance connected at the bus
 - voltage and frequency dependent source at the bus
 - constant real and reactive power drawn from the bus
- 588 The voltage of a particular bus can be controlled by controlling the_____.
- active power of the bus
 - reactive power of the bus
 - phase angle
 - both (a) and (b)
- 589 The voltage of a particular bus can be controlled by controlling _____.
- phase angle
 - reactive power of the bus
 - active power of the bus
 - phase angle and reactive power
- 590 A power system consists of two areas connected via a tie line. While entering the data for load flow the tie line parameters and its connectivity data were inadvertently left out. If the load flow program is run with this incomplete data, then the load flow calculations will converge only if_____.
- One slack bus is specified in the first are
 - One slack bus is specified in the second are
 - One slack bus is specified in either of the two areas.

- d. Two slack buses, one in each area, are specified
- 591 When the load on a transmission line is equal to the surge impedance loading_____.
- the receiving-end voltage is less than the sending-end voltage
 - the sending-end voltage is less than the receiving-end voltage
 - the receiving-end voltage is equal to the sending-end voltage
 - none of these
- 592 The receiving-end voltage of a transmission line will be greater than the sending-end voltage if the load is_____.
(SIL-surge impedance loading)
- greater than SIL
 - less than SIL
 - equal to SIL
 - none of these
- 593 The SIL of a single circuit 220 kV line is around_____.
- 120 MW
 - 90 MW
 - 220 MW
 - 400 MW
- 594 What is the surge impedance loading of a lossless 400 kV, 3-phase, 50 Hz overhead line of average of surge impedance of 400 ohms?
- 400 MW
 - $400\sqrt{3}$ MW
 - $400 \div \sqrt{3}$ MW
 - 400 kW
- 595 Consider the following statements: Surge impedance loading of a transmission line can be increased by 1. Increasing its voltage level. 2. Addition of lumped inductance in parallel. 3. Addition of lumped capacitance in series.4. Reducing the length of the line. Of these statements:
- 1 and 3 are correct.
 - 1 and 4 are correct.
 - 2 and 4 are correct.
 - 3 and 4 are correct.
- 596 A lossless radial transmission line with surge impedance loading_____.
- takes negative VAR at sending end and zero VAR at receiving end
 - takes positive VAR at sending end and zero VAR at receiving end
 - has flat voltage profile and unity power factor at all points along it
 - has sending-end voltage higher than receiving-end voltage and unity power factor at sending end
- 597 What does the standing wave ratio (SWR) of unity imply?
- Transmission line is open-circuited
 - Transmission line is short-circuited
 - Transmission line's characteristic impedance is equal to load impedance.
 - Transmission line's characteristic impedance is not equal to load impedance.
- 598 Consider the following statements:
1. Equivalent-T circuit of a long line is preferred to equivalent- π circuit.
2. The nature of reactive power compensation is different for peak load and off- peak load conditions.
3. Ferranti effect is significant only on medium and long lines. Which of the statements given above are correct?
- 1 and 2 only
 - 1 and 3 only
 - 2 and 3 only
 - 1, 2 and 3
- 599 For a good voltage profile under no-load condition, a long line needs_____.
- shunt capacitors at receiving end
 - shunt reactors at the receiving end
 - shunt resistance at receiving end

- 600 No-load compensation of a high voltage line involves_____.
- shunt capacitors
 - shunt reactors
 - series capacitors
 - Auto-transformer
- 601 Full-load compensation in a line requires_____.
- shunt capacitors
 - series capacitors
 - transformers
 - shunt reactors
- 602 Use of additional shunt capacitor can be made for increasing the capability of line as it
- reduces surge impedance Z_0 .
 - increases phase shift β .
 - increase in α .
 - all of the above
- 603 To increase the transmission capability of a high voltage long line_____.
- the resistance can be increase
 - the resistance can be decrease
 - the series reactance can he reduce
 - the shunt admittance can be reduce
- 604 Power dispatch through a line can be increased by_____.
- installing series capacitors
 - installing shunt capacitors
 - installing series reactor
 - installing shunt reactor
- 605 The power transmitted will be maximum when_____.
- line reactance is high
 - corona losses are minimum
 - sending-end voltage is more
 - receiving-end voltage is more
- 606 For constant voltage transmission, the voltage drop along the line is maintained constant by installing_____.
- capacitors
 - inductors
 - resistors
 - synchronous phase modifiers at the receiving end
- 607 Constant voltage transmissions have the drawback(s) of_____.
- increase of short-circuit current of the system
 - lower reserve of lines in case of line trouble
 - increased risk of interruption of supply due to falling of synchronous motors out of synchronism
 - all of the above
- 608 Constant voltage transmission has the advantage(s) of_____.
- availability of steady voltage at all loads at the receiving end
 - possibility of better protection for the line due to possible use of higher terminal reactance
 - possibility of carrying increased power for a given conductor size increase of long distance heavy power transmission
 - all of the above
- 609 Constant voltage transmission has the advantage(s) of_____.
- increase of short-circuit current of the system
 - large reserve of lines in case of line trouble
 - improvement of power factor at the times of moderate and heavy loads
 - all of the above
- 610 A synchronous compensator absorbs inductive reactive power. It is_____.
- overexcited
 - normally excited
 - Under excited
 - none of these
- 611 A synchronous phase modifier supplies_____.
- both active and reactive powers
 - both lagging and leading reactive power
 - inductive reactive power only

- 612 A synchronous phase modifier as compared to synchronous motor of the same rating has_____.
- larger shaft diameter and higher speed
 - smaller shaft diameter and higher speed
 - larger shaft diameter and smaller speed
 - smaller shaft diameter and smaller speed
- 613 Phase modifier is normally installed in case of_____.
- short transmission lines
 - medium length lines
 - long lines
 - for any length of lines
- 614 Which of the following statements is not true?
- Synchronous phase modifiers are installed at sending end
 - Synchronous phase modifiers are installed at load en
 - Synchronous phase modifiers are nothing but synchronous motors (specially designed).
 - Synchronous phase modifiers do not carry load
- 615 Capacitors are used in power system to_____.
- improve supply power factor
 - improve voltage regulation
 - change the load characteristics
 - all of the above
- 616 Series capacitors on transmission lines are of little use when_____.
- the load VAR requirement is small
 - the load VAR requirement is large
 - the load VAR requirement is fluctuating
 - series capacitors are never used in transmission lines
- 617 The reactive power transfer over a line mainly depends on_____.
- power angle δ .
 - $|V_s| - |V_R|$
 - V_s .
 - V_R .
- 618 For a fixed value of complex power flow in a transmission line having a sending end voltage V , the real power loss will be proportional to_____.
- V
 - V^2
 - $1/V^2$
 - $1/V$
- 619 For a fixed receiving-end and sending-end voltages in a transmission system, what is the locus of the constant power?
- A straight line.
 - An ellipse.
 - A parabola
 - A circle.
- 620 Conduit pipe is generally employed for protection of_____.
- unsheathed cables
 - armoured cables
 - PVC sheathed cables
 - all of above
- 621 Sheaths are used in cables to_____.
- provide proper insulation
 - provide mechanical strength
 - prevent ingress of moisture
 - none of the above
- 622 The bedding on a cable consists of_____.
- jute strands
 - hessian tape
 - paper tape compounded with a fibrous material
 - any of the above
- 623 The material(s) used for armouring of an underground cable is/are_____.
- galvanized steel wire
 - steel tape
 - aluminum
 - either (a) or (b)

- 624 Metallic shielding is provided on underground cables to_____.
- reduce thermal resistance
 - reduce corona effect
 - control the electrostatic voltage stress
 - all of the above
- 625 Metallic shielding provided on cables is usually of thickness_____.
- 0.1 - 0.8 mm.
 - 3 - 5 mm.
 - 10 - 15 mm.
 - 15- 25 mm.
- 626 The effect of bonding the cable is_____.
- to increase the effective resistance and inductance
 - to increase the effective resistance but reduce inductance
 - to reduce the effective resistance and inductance
 - to reduce the effective resistance but increase the inductance
- 627 The thickness of insulation layer provided on the conductor, in cables, depends upon_____.
- operating voltage
 - current to be carried
 - power factor
 - both (a) and (b)
- 628 The insulating material used for cables should have all of the following except_____.
- high dielectric strength, high mechanical strength, high tensile strength and plasticity, high resistivity and high viscosity at impregnation temperature
 - low thermal coefficient, low permittivity, acid proof, non-inflammable and non-hygroscopic
 - high water absorption
 - capability of withstanding high rupturing voltages
- 629 Empire tape is_____.
- varnished cambric
 - impregnated paper
 - vulcanized rubber
 - enamel insulation
- 630 Paper as an insulating material has the main drawback that it_____.
- is hygroscopic
 - has poor dielectric strength
 - has low insulation resistivity
 - has high capacitance
- 631 In paper insulated cables, the conductor x-section is usually limited to_____.
- 50 mm²
 - 250 mm²
 - 600 mm²
 - 1200 mm²
- 632 The dielectric strength of impregnated paper is about_____.
- 30 kV/mm
 - 20kV/mm
 - 15 kV/mm
 - 5 kV/mm
- 633 Paper used as an insulating material is usually treated with oily compound because it_____.
- is hygroscopic
 - gets electro-statically charged at high voltage
 - is porous
 - all of the above
- 634 Single-core cables are usually not provided with armouring in order to_____.
- avoid excessive loss in the armouring
 - make the cable more flexible
 - make the cable non-hygroscopic
 - none of the above
- 635 Single-core cable should have armour made of_____.
- magnetic material
 - non-magnetic and non-conducting material

- c. non-magnetic but conducting material
- 636 Multi-core cables generally use_____.
- oval shaped conductors
 - sector shaped conductors
 - square conductors
 - either (a) or (b)
- 637 In a 3-phase, 4-wire cable, the X-sectional area of neutral conductor is_____.
- half of the area of phase conductor
 - equal to the area of phase conductor
 - double the area of phase conductor
 - 1.5 times the area of phase conductor
- 638 The belted type construction is not suitable for cables used for voltages exceeding 22 kV because of_____.
- development of both radial and tangential stresses
 - formation of vacuous spaces and voids on loading and unloading owing to non-homogeneity of dielectric in belted construction
 - local heating caused by power loss at the centre filling owing to leakage current produced by tangential stresses along the impregnated paper insulation resulting in breakdown at any time
 - all of the above
- 639 SL type cables, over H-type cables, have the advantage(s) of_____.
- possibility of bending of cables owing to no overall lead sheath
 - less tendency for oil drainage on hilly routes owing to elimination of filler spaces containing compound
 - easy manufacturing
 - both (a) and (b)
- 640 Screened type cables, over belted cables, have the advantage(s) of_____.
- reduced possibility of core to core faults
 - uniform radial electric stresses in all sections of the dielectric
 - no possibility of formation of voids within the dielectric
 - increased current carrying capacity
 - all of the above
- 641 In a 3-core extra high voltage cable, a metallic screen around each core, insulation is provided to_____.
- facilitate heat dissipation
 - give mechanical strength
 - obtain radial electric stress
 - obtain longitudinal electric stress
- 642 As the operating voltage and consequently the electric stress on the dielectric of solid type cable is increased from 4 low value, the dielectric power factor $\cos \phi$ remains almost unchanged up to a certain value of the stress beyond which $\cos \phi$ increases very rapidly. This is due to increase in_____.
- resistivity of dielectric material
 - ionization in the voids present in the dielectric
 - core-to-core capacitance of the cable
 - core-to-earth capacitance of the cable
- 643 Oil-filled cables have the advantage(s) of_____.
- no ionization, oxidation and formation of voids
 - possibility of increased temperature range in service
 - more maximum permissible stresses
 - all of the above
- 644 Oil-filled cables have the advantage(s) of_____.
- smaller overall size
 - most perfect impregnation
 - easy detection of fault
 - all of the above
- 645 Oil-filled cables have the drawback(s) of_____.

- a. no possibility of impregnation after sheathing
 b. greater cost and complicated laying of cables and maintenance
 c. high thermal resistance
 d. all of the above
- 646 Cables used for 220 kV lines are invariably_____.
- a. compressed oil or compressed gas insulated
 b. paper insulated
 c. mica insulated
 d. none of the above
- 647 The insulation used in a cable designed for use on 1,000 kV is usually_____.
- a. impregnated paper
 b. compressed SF₆ gas
 c. PVC
 d. any of the above
- 648 Sulphur hexafluoride cable is insulated by_____.
- a. impregnated paper
 b. polyvinyl chloride
 c. high pressure oil
 d. compressed gas
- 649 In compressed gas insulated cable SF₆ has the gas pressure in the range of_____.
- a. 10 - 20 mm Hg
 b. 80 - 100 mm Hg
 c. 3 - 5 kg/cm²
 d. 40 - 50 kg/cm²
- 650 At bridge crossings and near the railway track ternary lead cables are used because they_____.
- a. are of high tensile strength
 b. are of low coefficient of thermal expansion
 c. are of low specific gravity
 d. can withstand shocks and vibrations
- 651 Internal pressure cables have the advantage(s) of_____.
- a. elimination of external accessories
 b. suitability for vertical run without any fear of drainage with suitable designs
 c. marked improvement in the pf of the cable dielectric with the increased pressure
 d. all of the above
- 652 With the rise in temperature, the insulation resistivity_____.
- a. remains unchanged
 b. decreases linearly
 c. increases linearly
 d. reduces exponentially
- 653 The insulation resistance of a single-core cable is 200 MΩ/km. The insulation resistance for 5 km length is_____.
- a. 40 MΩ
 b. 1000 MΩ
 c. 200 MΩ
 d. 8 MΩ
- 654 The power factor of an open-ended cable can be improved by_____.
- a. increasing the capacitance
 b. decreasing the capacitance
 c. increasing the conductor resistance
 d. increasing the insulation resistance
- 655 The capacitance of a cable increases_____.
- a. linearly with the increase in cable length
 b. linearly with the decrease in cable length
 c. exponentially with the increase in cable length
 d. none of the above
- 656 The capacitance of a cable depends upon the_____.
- a. length of the cable
 b. relative permittivity of dielectric used in cable
 c. ratio of sheath diameter and core diameter
 d. all of the above
- 657 The charging current drawn by the cable_____.

- a. lags behind the voltage by 90°
 b. leads the voltage by 90°
 c. leads the voltage by 180°
 d. none of the above
- 658 In underground cables, the electrostatic stress is_____.
- a. maximum at conductor surface and minimum at the sheath
 b. minimum at conductor surface and maximum at the sheath
 c. same at the conductor and sheath
 d. zero at the conductor as well as on the sheath
- 659 In a cable of conductor diameter 'd' and overall diameter with dielectric material 'D', the maximum dielectric stress_____.
- a. occurs at the conductor surface and is proportional to d
 b. occurs at the conductor surface and is proportional to $1/d$
 c. occurs at the middle of the dielectric and is proportional to $1/D$
 d. occurs at the outer surface of the dielectric and is proportional to D
- 660 To obtain the minimum value of stress in cables, the ratio (R/r) should be_____.
- a. 2.13
 b. 2.718
 c. 1.96
 d. 1.5
- 661 The surge impedance of a 50 miles long underground cable is 50Ω . For a 25 miles length it will be_____.
- a. 25Ω
 b. 50Ω
 c. 100Ω
 d. none of these
- 662 The breakdown of insulation of a cable can be avoided economically by using_____.
- a. insulation layers of different dielectrics
 b. inter-sheath
 c. either (a) or (b)
 d. none of the above
- 663 Capacitance grading of cable means_____.
- a. use of dielectrics in different concentrations
 b. introduction of capacitances at various lengths of cable to counter the effect of inductance
 c. use of dielectrics of different permittivity
 d. grading according to capacitance per km length of the cable
- 664 Grading of cables_____.
- a. reduces insulation cost and increases current rating
 b. reduces insulation cost but decreases current rating
 c. increases both cost and rating
 d. none of the above
- 665 The inter-sheaths in cables are used to_____.
- a. provide proper stress distribution
 b. minimize the stress
 c. use inferior insulation
 d. provide protection against moisture and voltage surges.
 e. provide protection against current and voltage surges
- 666 The desired overall diameter of the conductor without increasing its x-sectional area can be had by_____.
- a. using aluminum core instead of copper
 b. stranding the copper conductors around a hemp centre
 c. stranding the copper conductors over a lead tube
 d. any of the above
- 667 In a 3-core cable, the capacitance between two conductors (with sheath earthed) is $3 \mu\text{F}$. The capacitances per phase will be_____.
- a. $1.5 \mu\text{F}$
 b. $3 \mu\text{F}$
 c. $6 \mu\text{F}$

- d. 12 μF
- 668 Underground cables are laid at sufficient depth so as to_____.
 a. minimize temperature stresses
 b. minimize effects of shocks and vibrations owing to passing vehicle set
 c. avoid being unearthed easily owing to removal of soil
 d. both (a) and (b)
- 669 In case the communication cables are to be laid parallel to power cables the distance between the two should be at least_____.
 a. 0.5 m
 b. 2.0 m
 c. 4.0 m
 d. 0.05 m
- 670 While crossing the road the cable should be_____.
 a. buried in trenches
 b. surrounded by sawdust to absorb vibrations
 c. laid in conduits or pipes
 d. none of the above
- 671 Consider the following statements:
 1. The insulation resistance of cable will increase if the length of cable is increase.
 2. For the same overall diameter of cable, the grading of cable will increase the safe working voltage.
 3. The normal operating temperature of PVC cable is 70°.
 The normal operating temperature of PVC cable is 70°
 Of these statements
 a. 1 and 2 are correct.
 b. 2 and 3 are correct.
 c. 3 and 4 are correct.
 d. 1 and 4 are correct.
- 672 The source(s) of heat generation in cables is/are_____.
 a. copper loss in conductor
 b. dielectric losses in cable insulation
 c. losses in metallic sheathings and armoring
- d. all of the above
- 673 A cable carrying ac has_____.
 a. leakage losses only
 b. hysteresis losses only
 c. hysteresis and leakage losses only
 d. hysteresis, leakage and friction losses
- 674 Dielectric hysteresis loss in a cable varies as_____.
 a. impressed voltage
 b. (impressed voltage)²
 c. (impressed voltage)^{1/2}
 d. (impressed voltage)^{3/2}
- 675 The current carrying capacity of cables in dc is more than that in a It is mainly due to_____.
 a. smaller hysteresis losses
 b. absence of harmonics
 c. absence of ripples
 d. none of the above
- 676 The fault(s) which are likely to occur in cables is/are_____.
 a. breakdown of cable insulation
 b. cross- or short-circuit fault
 c. open-circuit fault
 d. all of the above
- 677 The lead sheath of the cable may get damaged due to_____.
 a. mechanical injury
 b. crystallization of lead through vibrations
 c. chemical action with impurities present in the soil when buried in earth
 d. any of the above
- 678 The cables should not be operated too hot otherwise_____.
 a. expansion of oil may cause sheath to burst
 b. the oil may lose its viscosity and it may start drawing off from higher levels
 c. unequal expansion may create voids in the insulation leading to ionization

- d. rapid increase in dielectric losses with temperature may cause thermal instability
- e. all of the above
- 679 The breakdown voltage of a cable depends upon_____.
- a. presence of moisture
- b. operating temperature
- c. time of application of the voltage
- d. all of the above
- 680 Breakdown of cable insulation may occur due to_____.
- a. thermal instability
- b. puncture
- c. tracking
- d. any of the above
- 681 Fiber-optic cables are used in power system applications mainly for_____.
- a. SCAD
- b. communication between power station and substation
- c. communication between power station and load control center
- d. all of the above
- 682 Solid type cables are not considered suitable for operating voltages exceeding 66 kV because_____.
- a. skin effect dominates on the conductor
- b. there is a danger of breakdown of insulation because of formation of voids in the layers of dielectric
- c. there is a corona loss between conductor and sheath material
- d. insulation may melt due to heating
- 683 A 3 -phase, 4-wire system is commonly used for_____.
- a. primary distribution
- b. secondary distribution
- c. primary transmission
- d. secondary transmission
- 684 The rated voltage of a 3-phase power system is given as_____.
- a. RMS phase voltage
- b. peak phase voltage
- c. RMS line to line voltage
- d. peak line to line voltage
- 685 Which of the following is usually not the generating voltage?
- a. 6.6 kV.
- b. 9.9 kV.
- c. 11 kV.
- d. 13.2 kV.
- 686 In a transmission system the feeder supplies power to
- a. transformer substations (step-up)
- b. service mains
- c. distributors
- d. all of the above
- 687 Feeder is designed mainly from the point of view of_____.
- a. its current carrying capacity.
- b. voltage drop in it.
- c. operating voltage.
- d. operating frequency.
- 688 Distributors are designed from the point of view of_____.
- a. its current carrying capacity
- b. operating voltage
- c. voltage drop in it
- d. operating frequency
- 689 Transmission and distribution of electric power by underground system is superior to overhead system in respect of_____.
- a. appearance and public safety
- b. maintenance cost
- c. frequency of faults, power failure and accidents
- d. all of the above
- 690 The main drawback(s) of underground system over overhead system is/are_____.
- a. exposure to lightning
- b. heavy initial cost
- c. exposure to atmospheric hazards such as smoke, ice, wind etc.
- d. inductive interference between power and communication circuits

- 691 The main drawback(s) of overhead system over underground system is/are_____.
- underground system is more flexible than overhead system
 - higher charging current
 - surge problem
 - high initial cost
- 692 By increasing the transmission voltage double of its original value, the same power can be dispatched keeping the line loss_____.
- equal to its original value
 - half of original value
 - double the original value
 - one-fourth of original value
- 693 If a fixed amount of power is to be transmitted over certain length with fixed power loss, it can be said that volume of conductor is_____.
- inversely proportional to magnitude of the voltage and that of power factor of the load
 - inversely proportional to square of the voltage and square of power factor of the load
 - proportional to square of voltage and that of power factor of the load
 - proportional to magnitude of the voltage only
- 694 For the same voltage drop, increasing the voltage of a distributor n- times
- reduces the x-section of the conductor by n times
 - increases the x-section of the conductor by n times
 - reduces the x-section of the conductor by n^2 times
 - increases the x-section of the conductor by n^2 times
- 695 The volume of copper required for an AC transmission line is inversely proportional to_____.
- current
 - voltage
 - pf
 - both (b) and (c)
- 696 Improving p.f._____.
- reduces current for a given output
 - increases losses in line
 - increases the cost of station equipment
 - none of the above
- 697 For a given amount of power to be transmitted over a certain distance with fixed power loss, the volume of copper required is_____.
- directly proportional to voltage
 - inversely proportional to voltage
 - inversely proportional to the square of voltage and pf of the load
 - directly proportional to the square of the voltage and pf of the load
- 698 For the same conductor length, same amount of power, same losses and same maximum voltage to earth, which system requires minimum conductor area?
- single phase AC
 - 3 phase AC
 - 2 wire AC
 - 3 wire DC
- 699 Which of the following distribution systems is preferred for good efficiency and high economy?
- Single-phase, 2-wire system.
 - 2-phase, 3-wire system.
 - 3-phase, 3-wire system.
 - 3-phase, 4-wire system.
- 700 The approximate cost ratio of a 220 kV, underground cable transmission and 220 kV overhead transmission is_____.
- 50
 - 25
 - 13
 - 5
- 701 With the same maximum voltage to earth, which of the following AC systems with 0.8 pf will need more copper in comparison to DC 2-wire system?

- a. Single-phase, 2-wire (midpoint earthed).
 b. Single-phase, 3-wire (neutral half of outer).
 c. Three-phase, 3-wire.
 d. Three-phase, 4-wire (neutral = outer).
- 702 The main reason for using high voltage for long distance power transmission is_____.
- a. reduction in transmission losses
 b. reduction in time of transmission
 c. increase in system reliability
 d. none of the above
- 703 66 kV is suitable for transmission of power over _____.
- a. 30 km
 b. 60 km
 c. 120 km
 d. 200 km
- 704 If 3 MW power is to be transmitted over a distance of 30 km, the desirable transmission voltage will be_____.
- a. 11 kV
 b. 33 kV
 c. 66 kV
 d. 3.3 kV
- 705 The highest transmission voltage used in India is_____.
- a. 400 kV
 b. 220 kV
 c. 132 kV
 d. 765 kV
- 706 If variable part of annual cost on account of interest and depreciation on the capital out lay is equal to the annual cost of electrical energy wasted in the conductors, the total annual cost will be minimum and the corresponding size of conductor will be the most economical. This statement is known as_____.
- a. Lenz' s law
 b. Faraday's law
 c. Kelvin's law
- d. Ohm's law
- 707 The supports used for transmission lines should have the characteristic(s) of_____.
- a. high mechanical strength and longer life
 b. good looking, light in weight and easily accessible for painting and erection of line conductors
 c. cheap in initial as well in maintenance cost
 d. all of the above
- 708 The wooden poles well impregnated with kerosene oil or any preservative compounds have life of_____.
- a. 25 - 30 years.
 b. 20 - 25 years.
 c. 10 - 15 years.
 d. 5 - 10 years.
- 709 Steel poles for transmission lines need protection against_____.
- a. borer
 b. termites
 c. corrosion
 d. all of these
- 710 RCC poles usually have the spans of_____.
- a. 250 - 400 m.
 b. 80 - 150 m.
 c. 50 - 80 m.
 d. 25 - 50 m.
- 711 In India for distribution of electric power we usually_____use
- a. wooden poles
 b. steel poles
 c. RCC poles
 d. both (b) and (c)
- 712 Conductors used in HT transmission lines are stranded because of_____.
- a. increased tensile strength
 b. ease in handling
 c. cheaper in cost
 d. reduced resistivity

- 713 Consider the following materials for line conductors :1. Hard drawn copper.2. Cadmium copper.3. Aluminum.4. Galvanized steel.The correct sequence of the descending order of their electrical conductivities is_____.
- 1, 2, 4, 3
 - 2, 1, 4, 3
 - 2, 1, 3, 4
 - 1, 2, 3, 4
- 714 Which of the following properties has got higher value for aluminum in comparison to that of copper?
- Electrical resistivity.
 - Melting point.
 - Thermal conductivity.
 - Specific gravity.
- 715 In a 7/30 ACSR conductor why is grease put between steel and aluminum conductors?
- To reduce corrosion by electrolytic action between zinc (galvanizing agent on steel) and aluminum.
 - To reduce friction between the strands.
 - To reduce leakage of current from aluminum strands to steel strands.
 - To eliminate air pockets.
- 716 ACSR is used in place of copper in overhead lines because of_____.
- higher current carrying capacity
 - being lighter in weight
 - economy
 - higher tensile strength
- 717 ACSR conductors' have_____.
- all conductors made of aluminum
 - outer conductors made of aluminum
 - inner conductors made of aluminum
 - no conductors made of aluminum
- 718 "Expanded ACSR" are conductors composed of_____.
- larger diameter individual strands for a given cross section of the aluminum strands
 - larger diameter of the central steel strands for a given overall diameter of the conductor
 - larger diameter of the aluminum strands only for a given overall diameter of conductor
 - A filter between the inner steel and the outer aluminum strands to increase the overall diameter of the conductor
- 719 The function of steel wire in an ACSR conductor is to_____.
- compensate for skin effect
 - take care of surges
 - provide additional mechanical strength
 - reduce inductance
- 720 The material used for the manufacture of ground wire is_____.
- aluminum
 - galvanized steel
 - cast iron
 - stainless steel
- 721 Guy wire is employed for_____.
- providing protection against surges
 - providing emergency earth route
 - supporting the pole
 - all of the above
- 722 The sag of a transmission line is least affected owing to_____.
- weight of the conductor
 - current through the conductor
 - atmospheric temperature
 - ice deposition on the conductor
- 723 Effect of temperature rise in overhead lines is to_____.
- increase the sag and decrease the tension
 - decrease the sag and increase the tension
 - increase both sag and tension
 - decrease both sag and tension
- 724 The sag of a transmission line conductor in summer is_____.
- less than that in winter

- b. more than that in winter
c. same as in winter
d. independent of the any season
- 725 In a transmission line, sag depends upon_____.
- a. span length
b. tension in conductors
c. weight of the conductor per unit length
d. all of the above
- 726 Which of the following statements is correct?
- a. Ice on conductors increases skin effect.
b. Wind pressure reduces corona effect.
c. Wind pressure is taken to act at perpendicular to that for ice.
d. Ice on conductors reduces sag.
- 727 Wind loading in coastal regions is in the range of_____.
- a. 40 - 50 kg/m²
b. 150 kg/m²
c. 96 kg/m²
d. 16 kg/m²
- 728 The maximum tension in a section of overhead line conductor between two supports of unequal height occurs at_____.
- a. the higher support
b. the lower point
c. the midpoint of the conductor
d. None of the above
- 729 Stringing chart is useful_____.
- a. for finding the sag in the conductor
b. in the design of tower
c. in the design of insulator string
d. finding the distance between towers
- 730 Hot template curves are plots of_____.
- a. temperature and humidity
b. conductor sag and span lengths
c. conductor weight and sag
d. none of the above
- 731 The effect of wind pressure is more predominant on_____.
- a. insulators
b. transmission lines
c. supporting towers
d. none of the above
- 732 Galloping in transmission line conductors arises due to_____.
- a. asymmetrical layers of ice formation
b. vortex phenomenon in light winds
c. heavy weight of the line conductors
d. adoption of horizontal conductor configuration
- 733 Which one of the following is reduced by using stock bridge dampers on power overhead transmission lines?
- a. Sag.
b. Conductor vibration.
c. Line losses.
d. Mechanical tension.
- 734 The sag of the conductors of a transmission line is 2.5 m when the span is 250m. Now if the height of supporting tower is increased by 25%, the sag will_____.
- a. reduce by 25%
b. increase by 25%
c. reduce by 12.5%
d. remain unchanged
- 735 For a 400 kV line, the spacing between phase conductors is around_____.
- a. 8 m.
b. 11 m.
c. 14 m.
d. 17 m.
- 736 Stranded conductors usually have a central wire around which there are successive layers of 6,12,18,24 wires. For n-layers, the total number of individual wires is_____.
- a. $3n(n + 1)$
b. $2n(n + 1)$
c. $3n(n + 1) + 1$
d. $2n(n + 1) + 1$

- 737 The diameter of each strand is d then the diameter of n -layer stranded conductor will be _____.
- $(2n + 1)d$
 - $3(n + 1)d$
 - $(2n - 1)d$
 - $3(n - 1)d$
- 738 Strain type insulators are used _____.
- at dead ends
 - at intermediate anchor towers
 - on straight runs
 - any of (a) or (b)
- 739 Wavy structure of pin insulator increases its _____.
- mechanical strength
 - puncture strength
 - flash-over voltage
 - thermal strength
- 740 The voltage rating of a multiple shell (petticoat or rain shed) pin type insulator unit cannot be increased beyond a limiting value by increasing the number of shells, because _____.
- the internal voltage distribution between shells becomes unequal
 - the leakage path resistance starts diminishing
 - the disruptive critical voltage for the material of the insulator is reached
 - the puncture voltage of the material of the insulator is reached
- 741 Which types of insulators are used on 132 kV transmission lines?
- Pin type.
 - Disc type.
 - Shackle type.
 - Pin and Shackle type.
- 742 Whenever the conductors are dead-ended or there is a change in the direction of transmission line, the insulators used are of the _____.
- Pin type.
 - Suspension type
 - Strain type.
 - Shackle type.
- 743 Post type insulators are generally used in lines operating _____.
- above 100 kV
 - below 33 kV
 - at any voltage level, HV or EHV
 - none of the above
- 744 The number of discs in a string of insulators for 400 kV AC overhead transmission line lies in the range of _____.
- 32 to 33
 - 22 to 23
 - 15 to 16
 - 9 to 10
- 745 The non-uniform distribution of voltage across the units in a string of suspension type insulators is due to _____.
- unequal self-capacitance of the units
 - non-uniform distance of separation of the units from the tower body
 - the existence of stray capacitance between the metallic junctions of the units and the tower body
 - non-uniform distance between the cross-arms and the units
- 746 The voltages across the various discs of a string of suspension insulators having identical discs is different due to _____.
- surface leakage currents
 - series capacitance
 - shunt capacitance to ground
 - series and shunt capacitances
- 747 The string efficiency of a string of suspension insulators is dependent on _____.
- size of the insulators
 - number of discs in the string
 - size of tower
 - height of the tower
- 748 100 per cent string efficiency means _____.

- a. one of the insulator discs shorted
 b. zero potential across each disc
 c. equal potential across each insulator disc
 d. none of the above
- 749 In a suspension type insulator the potential drop is
 a. maximum across the lowest disc
 b. maximum across the topmost disc
 c. uniformly distributed over the discs
 d. maximum across the middle disc
- 750 If the frequency of a transmission system is changed from 50 Hz to 100 Hz, the string efficiency
 a. will increase
 b. will decrease
 c. remain unchanged
 d. may increase or decrease depending on the line parameters
- 751 The string efficiency of a high-voltage line is around _____.
 a. 1
 b. 0.8
 c. 0.4
 d. 0.1
- 752 In three-unit insulator string, voltage across the lowest unit is 17.5 kV and string efficiency is 84.28%. The total voltage across the string will be equal to _____.
 a. 8.285 kV
 b. 44.25 kV
 c. 88.25 kV
 d. 442.5 kV
- 753 Two-insulator discs of identical capacitance value C makes up a string for a 22 kV, 50 Hz, single-phase overhead line insulation system. If the pin to earth capacitance is also C, then the string efficiency is _____.
 a. 50%
 b. 75%
 c. 90%
 d. 86%
- 754 In a cable the sheath radius is R and conductor radius is r. As r changes from 0.5R to 0.25R the maximum voltage gradient in the dielectric _____.
 a. decreases by about 6%
 b. increases by about 6%
 c. increases by about 15%
 d. decreases by about 15%
- 755 Consider the following statements :
 In the case of suspension type insulators, the string efficiency can be improved by 1. Using a longer cross arm. 2. Using a guard ring. 3. Grading the insulator discs. 4. Reducing the cross-arm length. Of these statements _____.
 a. 1, 2, and 3 are correct.
 b. 2, 3 and 4 are correct.
 c. 2 and 4 are correct.
 d. 1 and 3 are correct.
- 756 The ratio of puncture voltage to the flash-over voltage of a line insulator is _____.
 a. equal to 1
 b. lower than 1
 c. much greater than 1
 d. cannot say
- 757 The insulators may fail due to _____.
 a. flash over
 b. short-circuits
 c. deposition of dust
 d. any of the above
- 758 The purpose of guard ring in transmission lines is to _____.
 a. reduce the earth capacitance of the lowest unit
 b. increase the earth capacitance of the lowest unit
 c. reduce the transmission line losses
 d. none of the above
- 759 The use of a guard ring _____.
 a. equalizes the voltage division between insulator discs
 b. is unnecessary complication

- c. decreases string efficiency
d. none of the above
- 760 Corona is_____.
- partial breakdown of air
 - complete breakdown of air
 - sparking between lines
 - all of the above
- 761 Which of the following statements is true regarding corona?
- Corona takes place at a voltage lower than breakdown voltage.
 - Corona takes place at a voltage higher than breakdown voltage.
 - Corona is a current phenomenon.
 - Corona increases the transmission line efficiency.
- 762 Which of the following statements regarding corona are true? 1. It causes radio interference.2. It attenuates lightning surges. 3. It amplifies switching surges. 4. It causes power loss.5. It is more prevalent in the middle conductor of a transmission line employing a flat conductor configuration. Select the correct answer using the codes given below. Codes:
- 1, 3, 5
 - 2, 3, 4
 - 1, 2, 4, 5
 - 2, 3, 4, 5
- 763 Corona is accompanied by_____.
- violet visible discharge in darkness
 - hissing sound
 - vibration
 - power loss, radio-interference, ozone
 - all of the above
- 764 Ozone effect can be detected by_____.
- presence of ozone detected by odor
 - hissing sound
 - faint luminous glow of bluish color
 - all of the above
- 765 Corona loss increases with_____.
- decrease in conductor size and increase in supply frequency
 - increase in both conductor size and supply frequency
 - decrease in both conductor size and supply frequency
 - increase in conductor size and decrease in supply frequency
- 766 The good effect of corona on overhead lines is to_____.
- increase the line carrying capacity due to conducting ionized air envelope around the conductor
 - increase the power factor due to corona loss
 - reduce the radio interference from the conductor
 - reduce the steepness of surge fronts
- 767 Compared with a solid conductor of the same radius, corona appears on a stranded conductor at a lower voltage, because stranding_____.
- assists ionization
 - makes the current flow spirally about the axis of the conductor
 - produces oblique sections to a plane perpendicular to a axis of the conductor
 - produces surfaces of smaller radius
- 768 Corona loss can be reduced by the use of hollow conductors because_____.
- the current density is reduced
 - the eddy current in the conductor is eliminated
 - for a given cross section, the radius of the conductor is increased
 - of better ventilation in the conductor
- 769 Bundled conductors reduce_____.
- surface electric stress of conductor
 - increases the line reactance
 - decreases the line capacitance
 - none of the above

- 770 Corona loss in a transmission line is dependent on_____.
- diameter of the conductor
 - material of the conductor
 - height of the conductor
 - none of the above
- 771 Corona occurs between two transmission conductors when they_____.
- have high potential difference
 - are closely space
 - carry DC power
 - both (a) and (b)
- 772 In humid weather, the corona occurs at a voltage_____.
- much less than that needed in fair weather
 - much higher than that needed in fair weather
 - equal to that needed in fair weather
 - none of the above
- 773 The effect of corona is_____.
- increased energy loss
 - increased reactance
 - increased inductance
 - all of the above
- 774 The charging current in a transmission line increases due to corona effect because corona increases_____.
- line current
 - effective line voltage
 - power ions in lines
 - the effective conductor diameter
- 775 The chances of occurrence of corona are maximum during_____.
- humid weather
 - dry weather
 - winter
 - hot summer
- 776 Corona is likely to occur maximum in case of_____.
- distribution lines
 - transmission lines
 - domestic wiring
 - service mains
- 777 Corona is affected by_____.
- size of conductor
 - shape and surface condition of the conductor
 - operating voltage
 - all of the above
- 778 The only advantage of corona is that it_____.
- produces a pleasing luminous glow
 - makes line current sinusoidal
 - works as a safety valve for surges
 - ozone gas is produce
- 779 Presence of ozone owing to corona_____.
- improves the pf
 - reduces the pf
 - corrodes the material
 - improves regulation
- 780 What is the approximate breakdown strength of atmospheric air at N.T.P.?
- 0.3 kV/cm.
 - 1.0 kV/cm.
 - 3 kV/cm.
 - 30 kV/cm.
- 781 The dielectric strength of air under normal condition is about_____.
- 100 kV_p/cm
 - 21.1 kV_p/cm
 - 30 kV_p/cm
 - 200 kV_p/cm
- 782 Disruptive corona begins in smooth cylindrical conductors in air at NTP if the electric field intensity at the conductor surface goes up to_____.
- 21.1 kV_(rms) /cm.
 - 21.1 kV_(peak) /cm.
 - 21.1 kV_(average) /cm
 - 21.1 kV_(rms) /m.
- 783 The dielectric strength of air is_____.
- proportional to barometric pressure
 - proportional to absolute temperature

- c. inversely proportional to barometric pressure
d. none of the above
- 784 Visual critical voltage is _____.
a. lower than disruptive critical voltage
b. higher than disruptive critical voltage
c. equal to critical voltage
d. none of the above
- 785 Critical voltage limit of a transmission line is increased by _____.
a. increasing the radius of the conductors
b. increasing the spacing between conductors
c. reducing the spacing between conductors
d. reducing the radius of the conductors
- 786 The maximum permissible value of fair weather corona loss for an HV line is _____.
a. 0.6 kW/3-phase km.
b. 1.2 kW/3-phase km.
c. 0.3 kW/3-phase km.
d. 2.4 kW/3-phase km.
- 787 Corona losses are minimized when _____.
a. conductor size is reduce
b. smooth conductor is use
c. sharp points are provided in the line hardware
d. current density in conductors is reduce
- 788 The corona loss on a particular system at 50 Hz is 1 kW/km per phase. What is the corona loss at 60 Hz in kW/km per phase?
a. 0.83
b. 1
c. 1.13
d. 1.2
- 789 Corona loss can be reduced by using _____.
a. solid conductor of diameter
- b. hollow conductor of diameter
c. bundle conductor
d. both (a) and (b)
e. both(b) and (c)
- 790 In a transmission line the distributed constants are _____.
a. resistance and shunt conductance only
b. resistance and inductance only
c. resistance, inductance and capacitance only
d. resistance, inductance, capacitance and shunt conductance
- 791 Skin effect depends upon _____.
a. x-section of conductor
b. supply frequency
c. permeability of conductor material
d. all of the above
- 792 Skin effect in transmission line is due to _____.
a. supply frequency
b. self inductance of conductor
c. high sensitivity of material in the centre
d. both (a) and (b)
- 793 The effective resistance of a conductor will be the same as ohmic resistance when _____.
a. voltage is low
b. current is true sinusoidal
c. current is uniformly distributed in the x-section of the conductor
d. none of the above
- 794 When an alternating current flows through a conductor _____.
a. entire current passes through the core of the conductor
b. portion of conductor near the surface carries more current in comparison to the core
c. current remains uniformly distributed over the whole x-section of the conductor
d. portion of conductor near the surface carries less current in comparison to the core

- 795 The conductor carries more current on the surface in comparison to its core. This phenomenon is called the_____.
- skin effect
 - Ferranti effect
 - corona
 - Lenz's effect
- 796 Increasing the frequency of transmission line will_____.
- increase shunt reactance
 - decrease line resistance
 - increase line resistance
 - decrease series reactance
- 797 Skin effect exists in_____.
- cable carrying dc current
 - dc transmission line only
 - ac transmission line only
 - dc as well as ac transmission lines
- 798 Skin effect in a conductor becomes more pronounced_____.
- at higher frequency.
 - at lower frequency.
 - at zero requency
 - at dc voltage
- 799 The skin effect in conductor results in_____.
- increases in its dc resistance
 - decrease in its ac resistance
 - increase in its ac resistance
 - decrease in dc resistance
- 800 Skin effect_____.
- increases the effective resistance and effective internal reactance
 - reduces the effective resistance and effective internal reactance
 - increases the effective resistance but reduces the effective internal reactance
 - reduces the effective resistance but increases the effective internal reactance
- 801 The skin effect of a conductor reduces with the increase in_____.
- supply frequency
 - resistivity of the conductor material
 - x-section of conductor
 - permeability of conductor material
- 802 Skin effect in conductor is proportional to_____.
- (diameter of conductor)^{1/2}
 - diameter of conductor
 - (diameter of conductor)²
 - (diameter of conductor)⁴
- 803 In order to reduce the skin effect at UHF_____.
- copper tubes with silver plating are used
 - copper rods with silver plating are used
 - anodized conductors are used
 - painted conductors are used
- 804 The component inductance due to the internal flux-linkage of anon-magnetic straight solid circular conductor per meter length, has a constant value, and is independent of the conductor diameter, because_____.
- All the internal flux due to current remains concentrated on the peripheral region of the conductor
 - The internal magnetic flux density along the radial distance from the centre of the conductor increases proportionately to the current enclose
 - The entire current is assumed to flow along the conductor axis and the internal flux is distributed uniformly and concentrically.
 - The current in the conductor is assumed to be uniformly distributed throughout the conductor cross section.
- 805 Consider a long, two-wire line composed of solid round conductors. The radius of both conductors is 0.25 cm and the distance between their centers is 1 in. If this distance is doubled, then

- the inductance per unit length_____.
- doubles
 - halves
 - increases but does not double
 - decreases but does not halve
- 806 The inductance of single-phase two-wire power transmission line per km gets doubled when the_____.
- distance between the wires is double
 - distance between the wires is increased four fold
 - distance between the wires is increased as square of the original distance
 - radius of the wire is double
- 807 Inductance of an overhead line, in comparison to that of a cable of same capacity is_____.
- larger
 - smaller
 - of the same order
 - cannot say
- 808 The inductance of a power transmission line increases with_____.
- decrease in line length
 - increase in diameter of conductor
 - increase in spacing between the phase conductors
 - increase in load current carried by the conductors
- 809 The inductance of a transmission line is minimum when_____.
- GMD is high
 - GMR is high
 - both GMD and GMR are high
 - GMD is low and GMR is high
- 810 For a given conductor the value of GMR is_____.
- larger for capacitance calculation
 - larger for inductance calculation
 - same for both capacitance and inductance calculation
- 811 The self GMD of a conductor with three strands each of radius r and touching each other is_____.
- $r (0.7788 \times 2 \times 2)^{1/3}$
 - $r (0.7788 \times 2 \times 2 \times 2)$
 - $r (0.7788 \times 2 \times 2 \times 2)^3$
 - $r (0.7788 \times 2 \times 2)^3$
- 812 Hollow conductors are used in transmission lines to_____.
- reduce weight of copper
 - improve stability
 - reduce corona
 - increase power transmission capacity
- 813 Bundled conductors are employed to improve_____.
- appearance of the transmission line
 - mechanical stability of the line
 - current carrying capacity of the line
 - corona performance of the line
- 814 In HV transmission, the spacing between sub-conductors of a bundle is approximately_____.
- 20 cm
 - 40 cm
 - 80 cm
 - 3.5 cm
- 815 For a stranded conductor, the ratio of GMR to actual radius is_____.
- equal to 1
 - more than 1
 - equal to 0.7788
 - less than 0.7788
- 816 Bundled conductors in EHV transmission system provide_____.
- reduced capacitance
 - increased capacitance
 - increased inductance
 - increased voltage gradient
- 817 Which one of the following statements is not correct for the use of bundled conductors in transmission lines?
- Control of voltage gradient.
 - Reduction in corona loss.

- c. Reduction in radio interference.
d. Increase in interference with communication lines.
- 818 Bundled conductors are mainly used in high voltage overhead transmission lines to_____.
a. reduce transmission line losses
b. increase mechanical strength of the line
c. reduce corona
d. reduce sag
- 819 D_s , is the GMR of each sub-conductor of a four sub-conductor bundle conductor and d is the bundle spacing. What is the GMR of the equivalent single conductor?
a. $1.09 \sqrt{D_s \times d^3}$
b. $1.09 \sqrt{D_s^3 \times d^3}$
c. $1.09 (\sqrt{D_s \times d^3})^{1/4}$
d. $1.09 (\sqrt{D_s \times d^3})^{1/4}$
- 820 Proximity effect_____.
a. is more pronounced for large conductors, high frequencies and close proximity
b. increases the resistance of the conductors and reduces the self reactance
c. is substantially eliminated with stranded conductors
d. all of the above
- 821 Following effects are associated with transmission lines. 1. Skin effect. 2. Corona effect. 3. Proximity effect. The effective resistance of a conductor is increased by_____.
a. 1 only.
b. 2 and 3 only.
c. 1 and 3 only.
d. 1, 2 and 1.
- 822 Capacitance in equivalent circuit of a transmission line is due to_____.
a. current in the line
b. difference in potential of line
c. leakage of current
d. presence of magnetic flux
- 823 If the separation between the three phases of a transmission line is increased then_____.
a. the inductance will increase and capacitance will remain unchanged
b. both the inductance and capacitance will increase
c. the inductance will increase and the capacitance will decrease
d. the inductance will decrease and the capacitance will increase
- 824 The capacitance of an overhead transmission line increases with
1. increases in mutual geometrical mean distance
2. increase in height of conductors above ground
Select the correct answer from the following:_____.
a. Both 1 and 2 are true.
b. Both 1 and 2 are false.
c. Only 1 is true.
d. Only 2 is true.
- 825 The charging reactance of 50 km length of the line is 1500Ω . What is the charging reactance for 100 km length of the line?
a. 1500Ω
b. 3000Ω
c. 750Ω
d. 600Ω
- 826 Bundled conductors are used to_____.
a. reduce inductance of the line
b. reduce both inductance and capacitance
c. reduce corona loss
d. reduce corona loss and the line inductance
- 827 A 3-phase overhead transmission line has its conductors horizontally spaced with spacing between adjacent conductors equal to " d ". If now the conductors of the line are rearranged to form an equilateral triangle of sides equal to ' d ' then_____.

- a. average capacitance and inductance will increase
 b. average capacitance will decrease and inductance will increase
 c. average capacitance will increase and inductance will decrease
 d. surge impedance loading of the line increases
- 828 Proximity of a line to the earth surface_____.
- a. does not affect its capacitance to neutral
 b. increases the capacitance to neutral
 c. decreases the capacitance to neutral
- 829 If the effect of earth is taken into account, then the capacitance of line to ground_____.
- a. decreases
 b. increases
 c. remains unaltered
 d. becomes infinite
- 830 For equilateral spacing of conductors of an un-transposed 3-phase line, we have_____.
- a. balanced receiving-end voltage and communication interference
 b. unbalanced receiving-end voltage and no communication interference
 c. balanced receiving-end voltage and communication interference
 d. unbalanced receiving-end voltage and communication interference
- 831 Transmission lines are transposed to_____.
- a. reduce corona loss
 b. reduce skin effect
 c. prevent interference with neighboring telephone lines
- 832 Transposition of transmission line is done to_____.
- a. reduce line loss
 b. reduce skin effect
 c. balance line voltage drop
 d. reduce corona
- 833 High voltage transmission lines are transposed because then_____.
- a. corona losses can be minimize
 b. computation of inductance becomes easier
 c. voltage drop in the lines can be minimize
 d. phase voltage imbalances can be minimize
- 834 The concept of an electrically short, medium and long line is primarily based on the_____.
- a. nominal voltage of the line
 b. physical length of the line
 c. wavelength of the line
 d. power transmitted over the line
- 835 Equivalent π model is quite suitable for analyzing the performance of transmission line of_____.
- a. 50 km length
 b. 150 km length
 c. 250 km length
 d. All of the above lengths
- 836 Which of the following is neglected while analyzing a short transmission line?
- a. Shunt admittances
 b. Power losses
 c. Series impedance
 d. None of the above
- 837 In modeling the equivalent circuit of a short length overhead transmission line, the line resistance and inductance are only considered because line capacitance to ground is_____.
- a. equal to zero
 b. finite but very small
 c. finite but very large
 d. infinite
- 838 As compared to sending-end voltage, the receiving-end voltage of a short line under no-load condition is_____.
- a. higher
 b. lower

- c. remains the same
- 839 Which of the following voltage regulation is considered to be the best?
- 2%
 - 30%
 - 70%
 - 98%
- 840 The regulation of a line at full load 0.8 pf lagging is 12%. The regulations at full-load 0.8 pf leading can be _____.
- 24%
 - 18%
 - 12%
 - 4%
- 841 If in a short transmission line, resistance and inductive reactance are found to be equal and regulation appears to be zero, then the load will _____.
- have unity power factor
 - have zero power factor
 - be 0.707 leading
 - be 0.707 lagging
- 842 If X is the inductive reactance/phase and R is the resistance/phase of a short transmission line, what is the power factor angle of the load for maximum voltage regulation?
- $\cos^{-1}(X/R)$
 - $\tan^{-1}(X/R)$
 - $\cos^{-1}(R/X)$
 - $\tan^{-1}(R/X)$
- 843 For a short line if the receiving-end voltage is equal to sending-end voltage under loaded conditions _____.
- the sending-end power factor is unity
 - the receiving-end power factor is unity
 - the sending-end power factor is leading
 - the receiving-end power factor is leading
- 844 A single phase transmission line of impedance $j0.8$ ohm supplies a resistive load of 500 A at 300 V. The sending-end power factor is _____.
- unity
 - 0.8 lagging
 - 0.8 leading
 - 0.6 lagging
- 845 For an ac transmission line of length not exceeding 80 km, it is usual to lump the line capacitance at _____.
- the sending end
 - the receiving end
 - the midpoint
 - any convenient point
- 846 If L, C and Y are the inductance, capacitance and shunt admittance of a line per unit length, then for length l, _____.
- the shunt admittance is $Y \cdot l$.
 - the inductance is $L \div l$.
 - the capacitance is $C \div l$.
 - the shunt admittance is $Y \div l$.
- 847 Transmission efficiency of a transmission line increases with the _____.
- decrease in power factor and voltage
 - increase in power factor and voltage
 - increase in power factor but decrease in voltage
 - increase in voltage but decrease in power factor
- 848 Under no-load conditions, the current in a transmission line is because of _____.
- capacitance effect
 - corona effect
 - proximity effect
 - back flow from earth
- 849 Which of the following statements are correct?
- Flow of unduly heavy current is Ferranti effect.

- b. Ferranti effect occurs under unloaded condition of line.
 c. The rise in receiving-end voltage is Ferranti effect.
 d. Both and combined is Ferranti effect.
- 850 In a long transmission line under no-load condition _____.
- a. the receiving-end voltage is less than the sending end voltage
 b. the sending-end voltage is less than the receiving-end voltage
 c. the sending-end voltage is equal to the receiving-end voltage
 d. none of these
- 851 When is the Ferranti effect on long overhead lines experienced?
- a. The line is lightly loaded
 b. The line is heavily loaded
 c. The line is fully loaded
 d. The power factor is unity
- 852 Ferranti effect happens in transmission line when the line is _____.
- a. short and loaded
 b. long and loaded
 c. long and unloaded
 d. none of these
- 853 The ABCD constants of a 3 phase transposed transmission line with linear and passive elements _____.
- a. are always equal
 b. never equal
 c. A and D are equal
 d. B and C are equal
- 854 The values of A, B, C and D constants for a short transmission line are respectively _____.
- a. Z, 0, 1 and 1.
 b. 0, 1, 1 and Z.
 c. 1, Z, 0 and 1.
 d. 1, 1, Z and 0.
- 855 The angle of A, constant of the transmission line normally lies between _____.
- a. $90^\circ - 70^\circ$
 b. $70^\circ - 40^\circ$
 c. $40^\circ - 40^\circ$
 d. $10^\circ - 0^\circ$
- 856 For a transmission line with resistance R, reactance X and negligible capacitance, the generalized constant A is _____.
- a. 0
 b. 1
 c. $R + jX$
 d. $R + X$
- 857 The value of the 'A' parameter of a transmission line _____.
- a. increases with the increase in length of the line
 b. decreases with the increase in line length
 c. is independent of line length
 d. is independent of the span of tower
- 858 The generalized constant A for a medium line has magnitude _____.
- a. close to but less than 1
 b. close to but greater than 1
 c. nearly equal to the series impedance of the line
 d. equal to zero
- 859 For transmission line which one of the following relations is true?
- a. $AD - BC = 1$
 b. $-AD - BC = 1$
 c. $AD - BC = -1$
 d. $AD - BC = 0$
- 860 Which one of the following equations is correct?
- a. $-AB + CD = -1$
 b. $AD + CD = 1$
 c. $AB - CD = -1$
 d. $-AD + BC = -1$ where A, B, C and D are generalized circuit constants.
- 861 Lightning arresters are used in the power system to protect electrical equipment against _____.
- a. Direct strokes of lightning
 b. Over currents due to lightning

- c. Power frequency over-voltages
d. None of these
- 862 A lightning arrester provides_____.
- Low impedance path
 - High impedance path
 - Low resistance path
 - High resistance path between line and earth during operation
- 863 The lightning arrester is conducted_____.
- in series with the line
 - between line and earth
 - to a pole near the line
 - to circuit breaker
- 864 A lightning arrestor is usually located nearer to_____.
- bus bar
 - transformer
 - circuit breaker
 - isolator
- 865 The lightning arrester acts as_____.
- Surge diverter
 - Surge coil
 - Surge absorber
 - Surge reflector
- 866 A lightning arrester connected between the line and earth in a power system_____.
- Protects the terminal equipment against travelling surges
 - Protects the terminal equipment against direct lightning stroke
 - Suppresses high-frequency oscillations in the line
 - Reflects back the travelling waves approaching it
- 867 Which system will need the lightning arrester of least voltage rating?
- Solid ground neutral system
 - Insulated neutral system
 - Resistance grounded neutral system
 - Reactance grounded neutral system
- 868 What should be the location of Lightning Arrester use for the protection of the Direct Lightning Stroke?
- At the highest high of the protecting equipment
 - near the apparatus to be protected
 - At the entry and the exit of substation
 - All of these
- 869 What should be the location of Lightning Arrester use for the protection of the substation equipment?
- At the highest high of the protecting equipment
 - near the apparatus to be protected
 - At the entry and the exit of substation
 - All of these
- 870 What should be the location of Lightning Arrester use for the protection of the substation?
- At the highest high of the protecting equipment
 - near the apparatus to be protected
 - At the entry and the exit of substation
 - All of these
- 871 Which of the following are the correct description of the switchgear and protective device Standards?
- Circuit breaker up to 1000 V - IS 2516 (1985)
 - HT AC Circuit breaker - IS 13118 (1991)
 - Specification for low-voltage switchgear and control assemblies - IS 8623 (1993)
 - All of these
- 872 Basic classification of the Circuit breaker is based on
- Nature of Supply - AC or DC
 - System Voltage - LT or HT
 - Arc quenching medium used - Air, Vacuum, Oil or SF₆

- d. All of these
- 873 Which of the following is not an LT Circuit breaker?
- Oil CB
 - miniature CB
 - moulded Case CB
 - Earth Leakage CB
- 874 Which of the following is not an HT Circuit breaker?
- Vacuum CB
 - Oil CB
 - SF₆ CB
 - Miniature CB
- 875 Which of the following is not an LT Circuit breaker?
- 11 kV
 - 1000 V
 - 400 V
 - 220 V
- 876 The fault clearing time of a circuit breaker is usually_____.
- few cycles of supply voltage
 - one second
 - few seconds
 - few minutes
- 877 Which of the following circuit breakers is preferred for EHT applications?
- Bulk oil circuit breakers
 - Minimum oil circuit breakers
 - SF₆
 - Air blast circuit breakers
- 878 For high voltage, ac circuit breakers, the rated short circuit current is passed for_____.
- 10 seconds.
 - 1 sec
 - 0.1 seconds
 - 0.01 sec
- 879 Out of the following circuit breakers, which one has the lowest voltage range_____.
- Air-blast circuit breaker
 - Tank type oil circuit breaker
 - Air-break circuit breaker
 - SF₆ circuit breaker
- 880 Rated voltage – The rated maximum voltage of the circuit breaker is the highest_____, above nominal voltage for which the circuit breaker is designed and is the upper limits for operation.
- RMS voltage
 - Peak voltage
 - DC voltage
 - All of these
- 881 The rated voltage is depicted in _____ and used _____ voltage for the three-phase circuit.
- kV_{rms}, phase to phase
 - kV_{rms}, phase to Neutral
 - kV_{peak}, phase to phase
 - kV_{peak}, phase to Neutral
- 882 _____ of the circuit breaker is the RMS value of the current with which the circuit breaker shall be able to carry at rated frequency and at rated voltage continuously, under specified conditions.
- Rated current
 - Short Circuit Current
 - Breaking Capacity
 - Making Capacity
- 883 _____ is the terms expressed the highest number of short-circuit current that the breakers are capable of breaking under specified conditions of transient recovery voltage and power frequency voltage.
- Rated current
 - Short Circuit Current
 - Breaking Capacity
 - Making Capacity
- 884 What is the short circuit current rating of CB?
- RMS value of current that a breaker can carry in a fully closed condition without damage, for the specified time interval

- b. is its ability to withstand the effect of electromagnetic forces of the making current of a circuit breaker.
- c. the highest number of short-circuit current that the breakers are capable of breaking under specified conditions
- d. The rated normal current of the circuit breaker is the RMS value of the current with which the circuit breaker shall be able to carry at rated frequency and at rated voltage continuously
- 885 The contact resistance of a circuit breaker is. of the order of
- 200 ohms \pm 10
 - 20milli ohms \pm 10
 - 20 ohms \pm 10
 - 20 micro ohms \pm 10
- 886 The insulation resistance of high voltage circuit breaker is
- 2000 Mega ohm
 - 10 k Ohm
 - 20 Mega ohms
 - 1k Ohm
- 887 In a circuit breaker if the insulation resistance between phase terminal and the earthed frame is less than the specified limit, the probable cause could be_____.
- moisture
 - dirty insulation surface
 - carbon or copper particles sticking to the internal surface
 - any of these
- 888 If a circuit breaker does not operate on electrical compound, the probable reason could be_____.
- trip latch defective
 - spring defective
 - trip circuit open
 - any of these
- 889 Ionization in a circuit breaker is not facilitated by_____.
- material of contacts
 - increase of field strength
 - high temperature of surrounding medium
 - increase of mean free path
- 890 Which circuit breaker is generally used in railway traction?
- Vacuum circuit breaker
 - SF6 gas circuit breaker
 - Minimum oil circuit breaker
 - Air break circuit breaker
- 891 The number of cycles in which a high-speed circuit breaker can complete its operation is_____.
- 3 to 8
 - 10 to 18
 - 20 to 30
 - 40 to 50
- 892 Breaking capacity of a circuit breaker is usually expressed in terms of_____.
- Volts
 - MW
 - Amperes
 - MVA
- 893 Part of the circuit breaker helpful in breaking the current is_____.
- Trip Coil
 - Contacts
 - Handle
 - Medium
- 894 For single frequency transients, ratio of peak re-striking voltage to time between voltage zero and peak voltage is called_____.
- Re-striking voltage
 - Recovery voltage
 - Rate of rising re-striking voltage
 - Active recovery voltage
- 895 Which of the following are not included in maintenance schedule of CB?
- pre-commissioning check
 - Insulation resistance check
 - Leakage check
 - timing check

- 896 How we can check the mechanical operation of CB during maintenance?
 a. Manual Command
 b. Energizing relay
 c. Manual Command and Energizing relay
 d. live operation
- 897 Contacts (main and moving) of CB are checked _____ in year for normal duty but _____ in case of heavy duty.
 a. Once, Once
 b. Once, half-yearly
 c. Once, monthly
 d. Once, quarterly
- 898 Arc control devices of CB are checked _____ in year for normal duty but _____ in case of heavy duty.
 a. Once, Once
 b. Once, half-yearly
 c. Once, monthly
 d. Once, quarterly
- 899 Connecting Roads and Levers of CB are checked _____.
 a. Once in year
 b. half-yearly
 c. monthly
 d. quarterly
- 900 Oil level gauge of CB are checked _____.
 a. Once in year
 b. half-yearly
 c. monthly
 d. quarterly
- 901 Closing and Tripping mechanism of CB are checked _____.
 a. Yearly
 b. half-yearly
 c. monthly
 d. quarterly
- 902 Relay Setting of CB are checked _____.
 a. Yearly
 b. half-yearly
- c. monthly
 d. quarterly
- 903 Insulating oil of CB is checked _____ for normal duty but _____ in case of heavy duty.
 a. Yearly, Yearly
 b. Yearly, half-yearly
 c. Yearly, monthly
 d. Yearly, quarterly
- 904 Relay coil does not trip. Which of the following is not a suitable reason?
 a. Carbonized or burn contact
 b. Battery discharged
 c. Low spring tension
 d. Relay contact not proper
- 905 Opening of CB is too slow. Which of the following is not a suitable reason?
 a. More friction in pole unit
 b. Contact grip is too high
 c. Low battery voltage
 d. Oil contaminated
- 906 One of the poles does not close in CB. Which of the following is not a suitable reason?
 a. Damaged pull rod
 b. Moisture deposits
 c. Link might be broken
 d. Contact of the pole may be damaged
- 907 The resistance between terminals of poles is too high in CB. Which of the following is not a suitable reason?
 a. Contact surface damaged
 b. Contact pressure reduced
 c. Moisture deposited
 d. Oxide film on the contact surface
- 908 Maintenance frequency of CB is/are depends on which of the following?
 a. Frequency of operation
 b. atmospheric condition
 c. high fault level
 d. All of these

- 909 Which of the following is not a type test of CB?
- Temperature rise test
 - Short Circuit making/breaking test
 - rated short-time withstand the test
 - Mechanical operation test
- 910 Which of the following is not a type test of CB?
- Dielectric test
 - electrical endurance test
 - verification of overload performance
 - DC resistance measurement
- 911 What is maximum and minimum control voltage for closing and opening operation of Solenoid in the circuit breaker?
- 110, 85
 - 120, 80
 - 125, 75
 - 110, 90
- 912 DC resistance measurement test of CB is carried out with the help of _____ and it is the _____ test for CB.
- micro ohm meter, Type
 - micro ohm meter, Routine
 - micro ohm meter, Special
 - megger, Type
- 913 Which of the following quantity is worked out by performing Millivolt-Drop test in CB?
- Millivolt across the poles terminal
 - current through the poles terminal
 - Average value of pole resistance
 - All of these
- 914 Which of the following test is carried out to find make and break the operation of CB?
- Making and Breaking capacity test
 - Mechanical Endurance Test
 - Break Time Test
 - No-load Mechanical operation test
- 915 Which of the following test is carried out to prove the adequacy of design and manufacture of CB?
- Making and Breaking capacity test
 - Mechanical Endurance Test
 - Break Time Test
 - No-load Mechanical operation test
- 916 In mechanical endurance test, CB is opened and closed up to _____ times
- 100
 - 1000
 - 10000
 - 100000
- 917 In mechanical endurance test of CB, around _____ operations are conducted by energizing the relays and remaining are by closing the trip circuit by other means.
- 5
 - 50
 - 500
 - 0.25
- 918 Mechanical Endurance tests on _____ AC circuit breakers are conducted without current and voltage in the main circuit.
- high voltage
 - low voltage
 - high current
 - low current
- 919 The mechanical endurance test is conducted successfully if the contacts, linkages and all the other parts should be _____.
- in good condition
 - not show any permanent deformation or distortion
 - dimensions should be within original limits
 - All of these
- 920 By which of the following method electric power may be transmitted from one location to another location?
- Under Ground System
 - Overhead system
 - Under Ground System & Overhead system

- d. None of the above
- 921 By which of the following method bulk electric power for a long distance may be transmitted from one location to another location?
- Under Ground System
 - Overhead system
 - Under Ground System & Overhead system
 - None of the above
- 922 When to use an HVDC transmission line?
- for Bulk power transfer
 - Connect two unsynchronized system
 - low-cost transmission required
 - All of these
- 923 Which of the following transmission line have more initial cost?
- Overhead Transmission
 - Underground transmission
 - Both have almost the same initial cost
 - none of these of these
- 924 Name the cable or conductor which connects the distributor to the consumer terminals.
- Service Mains
 - Distributor
 - Feeders
 - None of the above
- 925 Which of the following materials are not used for the bus-bar or transmission and distribution of electrical power?
- Copper
 - Aluminium
 - Tungsten
 - Steel
- 926 The usual spans with R.C.C. poles are_____.
- 40 - 50 m
 - 60 - 100 m
 - 80 - 150 m
 - 200 - 300 m
- 927 What is the basic requirement of a transmission line?
- Low Cost and minimum outage
 - Deliver power at specific voltage and frequency with minimum loss
 - No interference with another frequency signal
 - All of these
- 928 Which of the following are the basic parameters of the transmission lines?
- Resistance / Conductance
 - Inductance
 - Capacitance
 - All of these
- 929 Which of the following is/are the phenomenon associate with overhead transmission line?
- Skin Effect & Proximity Effect
 - Ferranti Effect
 - Corona Effect
 - All of These
- 930 What is the value of current density permitted for transmission line?
- 150 A/cm²
 - 100 A/cm²
 - 50 A/cm²
 - Cu-150 A/cm² & Al-100 A/cm²
- 931 What is the transmission line voltage for different lengths of line?
- 132 kV for 120 km
 - 220 kV for 200 km
 - 400 kV for 300 km
 - All of these
- 932 As per Indian Electricity Rule 1956, Clause No 77, the minimum distance between the bottom conductor and the ground of a 400KV transmission line is_____meter.
- 8.84
 - 9.84
 - 10.84
 - 15
- 933 Clause, of IE 1956, minimum ground clearance of 33KV un-insulated

- electrical conductor is _____ meter.
- 3.2
 - 4.2
 - 5.2
 - 8
- 934 Which of the following are the general test conducted on an overhead transmission line?
- General Inspection
 - Conductor continuity test
 - insulation and Earth resistance test
 - All of these
- 935 Which of the following is generally covered in the general inspection?
- Visual inspection of structure and part
 - spacing between conductors and between conductor and earth
 - tension on conductor and insulation
 - All of these
- 936 Conductor continuity test and insulation resistance test is carried out with the help of _____.
- megger
 - impulse generator
 - multimeter
 - earth tester
- 937 Which of the following category of maintenance of overhead transmission lines can be carried out even if the system is live?
- patrolling from the ground
 - Inspection from top
 - shut-down period inspection
 - other work
- 938 Tilting, Broken, Rusting, Accumulation of dirt and dust, Spot of burning and puncher are the turn closely related to _____.
- Insulation
 - Conductor
 - Transmission Tower
 - All of these
- 939 Which of the following maintenance of overhead transmission line required prior public notice?
- patrolling from the ground
 - Inspection from top
 - shut-down period inspection
 - other work
- 940 Which of the following maintenance of overhead transmission line is mostly unscheduled?
- patrolling from the ground
 - Inspection from top
 - shut-down period inspection
 - other work
- 941 Which is/are the disadvantages of HVDC Transmission line?
- DC Circuit breaker is less reliable
 - Need Converters - High Cost and Harmonic and ripple
 - No reactive power
 - All of these
- 942 Which is/are the configuration of the HVDC transmission line?
- Mono-polar link
 - Bipolar Link
 - Homo-polar Link
 - All of these
- 943 _____ is the first HVDC line in India with _____ MW, approx _____ km,
- Rihand-Dadri, 15000, 800
 - Chandrapur-Padge, 1500, 750
 - Talcher-Kolar, 2000, 1350
 - Ballia-Bhiwandi, 2500, 780
- 944 Type of structure used for LT and 11 kV line
- Wooden Poles
 - Steel (Tubular) Poles
 - Reinforced Concrete (RCC) Poles
 - all of these
- 945 Where wooden poles are used?
- LT distribution network
 - Span up to 50 m
 - rural area
 - All of these

- 946 Which of the following distribution system poles has less life, strength and voltage level?
- Wooden Poles
 - Steel (Tubular) Poles
 - Reinforced Concrete (RCC) Poles
 - All of these
- 947 Where Steel (Tubular) Poles are used?
- LT distribution network
 - Span up to 80 m
 - city area
 - All of these
- 948 The surface of steel poles is galvanized or painted to prevent _____.
- rusting and corrosion
 - flashover
 - lightning
 - All of these
- 949 Why Reinforced Concrete (RCC) Poles are more famous?
- greater mechanical strength
 - longer life
 - good appearance
 - All of these
- 950 Single circuit, double circuit, narrow/broad base single circuit and Cast head single circuit with two/four sub conductor are the type of _____.
- LT Poles
 - HT Transmission Line (Steel Tower)
 - LT Conductor
 - HT Conductor
- 951 What are the advantages of Steel tower w.r.t. Reinforced Concrete (RCC) Poles?
- Higher Strength, span and life
 - Less weight and maintenance
 - assemble at site
 - All of these
- 952 Main disadvantages of Steel Tower is _____.
- so many fitting
 - erection cost is high
 - expert team required for fitting
 - All of these
- 953 Steel Towers are used for _____.
- 0.230 - 0.415 kV
 - 0.415 - 11 kV
 - 11 - 33 kV
 - 33 - 765 kV
- 954 Manual method, Derrick method, Dead man method and tower erection are the method of _____.
- Pole erection
 - Underground System
 - transmission tower testing
 - Transmission conductor erection
- 955 Which of the following insulation material is/are generally used in transmission and distribution lines?
- Porcelain
 - Glass
 - Stelite
 - All of these
- 956 Pin, Suspension, Disc, Strain, Shackle and Stay are the type of _____.
- Transmission/distribution line INSULATOR
 - Transmission/distribution line TOWER
 - Transmission/distribution line CONDUCTOR
 - Transmission/distribution line BASE
- 957 Pin type insulator is used up to _____ because beyond that it becomes bulky and uneconomical.
- 0.415 kV
 - 11 kV
 - 33kV
 - 66kV
- 958 Hewlett, Cemented cap and Core & Link are the type of _____ insulator.
- Pin
 - Suspension
 - Strain
 - Shackle

- 959 _____ Insulator is used when there is a Long Span or dead-end or sharp corner in transmission line.
- Suspension
 - Strain
 - Pin
 - Shackle
- 960 Which of the following insulator is not connected with the live conductor?
- Pin
 - Suspension
 - Strain
 - Stay (Guy)
- 961 Cracking, Porosity, Flash Over and Improper Glaze are the _____.
- Cause of insulator failure
 - Cause of pole failure
 - Cause of conductor failure
 - All of these
- 962 _____ is the resistance offered by the metal parts of the tower + the ground resistance.
- Tower Resistance
 - Tower Earthing Resistance
 - Tower footing resistance
 - Transmission Line Resistance
- 963 Which of the following will occur if the value of Tower footing resistance (R_t) is too high?
- Flash-Over
 - Back Flash-Over
 - Puncher
 - None of these
- 964 For reducing tower footing resistance it is better to use _____.
- Chemical and ground rods only
 - Chemical and counterpoise only
 - Ground rod and counterpoise only
 - Chemical, ground rods and counterpoise
- 965 _____ consists of four lengths of galvanized steel stranded wires, each fitted with a lug for connection to the tower leg at one end.
- Plate Earthing
 - Counterpoise earthing
 - Mesh Earthing
 - System Earthing
- 966 To protect the transmission line from lightning stroke and avoiding Back Flashover, Tower footing resistance (R_t) should not be more than _____ ohm in HV line and _____ ohm in EHV line.
- 10, 10
 - 10, 20
 - 5, 15
 - 7.5, 15
- 967 How we can compensate for the higher value of Tower footing resistance (R_t) in transmission line?
- increase insulation disc
 - increase tower height
 - Increase Earth wire count
 - All of these
- 968 Which of the following is/are essential substation equipment?
- circuit breaker
 - isolator
 - earthing switch
 - All of these
- 969 Which equipment is used for EHV lines to improve power transferability?
- Shunt capacitor
 - Shunt reactor
 - Series capacitor
 - All of these
- 970 Which among these is a configuration of an insulator? i. Vertical break type ii. Horizontal type iii. Horizontal break with two post insulator iv. Horizontal break centre post rotating double break v. Pantograph type

- a. Only ii and iii
b. i, ii, iii, and iv
c. i, ii, iii, iv, v
d. i, ii, iv, v
- 971 Which among these is a type of surge arrestor?
a. Conventional gapped arrestors
b. Metal oxide arrestors
c. Conventional gapped arrestors and Metal oxide arrestors
d. None of these
- 972 Which among these types of bus bars can be used outdoor?
a. Tubular
b. ACSR
c. AAC
d. All of these
- 973 Which material is used for indoor bus bar?
a. Copper
b. Aluminium
c. Silver
d. both Copper and Aluminium
- 974 At what pressure is the SF₆ gas filled in the whole installation of GIS substations?
a. 3 kg / cm²
b. 5 kg / cm²
c. 3 kg / m²
d. 5 kg / m²
- 975 Single bus-bar arrangement in substations is used for voltage is less than_____.
a. 11 kV
b. 33 kV
c. 132 kV
d. 220 kV
- 976 For voltage is greater than 33 KV, _____Bus bar arrangement is employed
a. Single
b. Double
c. Duplicate
d. None of the above
- 977 For cost and safety the outdoor substations are installed for voltages above_____.
a. 11 kV
b. 33 kV
c. 66 kV
d. 132 kV
- 978 Which of the following bus bar arrangement is generally employed in distribution system?
a. One-and-half breaker arrangement
b. Main and transfer arrangement
c. Ring main distribution system
d. Single bus bar arrangement system
- 979 Gas Insulated Substation is employed where_____.
a. high altitude substations
b. there is less space available
c. terrain region
d. All the above
- 980 A bus coupler circuit breaker is utilized in a substation for_____.
a. Joining the transmission line with station bus-bar
b. Joining main and transfer bus in a substation
c. Joining the generator with transfer
d. Joining the neutral of the generator with earth
- 981 Which of these gases is used in gas insulated substation _____?
a. SF₆
b. Hydrogen + SF₆
c. Nitrogen + SF₆
d. All of these
- 982 A bus bar is rated by_____.
a. Current only
b. Voltage only
c. Current, voltage and frequency
d. Current, voltage, frequency and short circuit current
- 983 In a substation, current transformers are used to_____.
a. Measuring purpose
b. Protection purpose

- c. Both Measuring and Protection purpose
d. None of these
- 984 The size of Gas Insulated Substation is significantly small compared to conventional substation because_____.
- High electronegative property of SF₆ gas
 - High dielectric property of SF₆ gas
 - High Insulation property of SF₆ gas
 - All the above
- 985 Which is the first equipment seen in the substation while coming from the transmission system_____.
- Circuit breaker
 - Lightning arrester
 - Current transformer
 - Transformer
- 986 How many cores are used in a cable for the transmission of voltages up to 66 kV?
- Single core
 - Two core
 - Three core
 - All of these
- 987 Why is the single core cables not provided with armouring?
- Avoids excessive loss in the armour
 - Make the cable more flexible
 - Make the cable non-hygroscopic
 - None of these
- 988 Which among the following cables are generally suited for the voltages up to 11 kV?
- Belted cables
 - Screened cables
 - Pressure cables
 - None of these
- 989 The electrostatic stress in underground cables is_____.
- Same at the conductor and the sheath
 - Minimum at the conductor and maximum at the sheath
 - Maximum at the conductor and minimum at the sheath
 - Zero at the conductor as well as on the sheath
- 990 The bedding on a cable consists of_____.
- Hessian cloth
 - Jute
 - Any of the above
 - None of the above
- 991 _____cables are used for 132 kV lines.
- High tension
 - Super tension
 - Extra high tension
 - Extra super voltage
- 992 Capacitance grading of cable implies
- Use of dielectrics of different permeability
 - Grading according to the capacitance of cables per km length
 - Cables using single dielectric in different concentrations
 - Capacitance required to be introduced at different lengths to counter the effect of inductance
- 993 The minimum dielectric stress in a cable is at_____.
- Armour
 - Bedding
 - Conductor surface
 - Lead sheath
- 994 In a cable immediately above metallic sheath_____is provided.
- Earthing connection
 - Bedding
 - Armouring
 - None of the above
- 995 _____is the process of assuring that all systems and components of a major piece of equipment, a process, a building or similar are designed, installed and tested according to the operational

- requirements of the owner or final client.
- Testing
 - Installation
 - Commissioning
 - Storage
- 996 _____ is the process of evaluating a system or its component(s) with the intent to find whether it satisfies the specified requirements or not.
- Testing
 - Installation
 - Commissioning
 - Storage
- 997 _____ standard specifies General Requirements for Type, Routine and Special Tests for transformer.
- IS 2026
 - IS 4029:2010
 - IS 9320:1979
 - IS 7132:1973
- 998 According to IS 2026: Part_1, Transformer tests shall be made at any ambient temperature between _____ °C and with cooling water (if required) at any temperature not exceeding _____ °C.
- 10-50, 30
 - 20-40, 25
 - 25-55, 45
 - 10-30, 30
- 999 According to IS 2026: Part_1, Transformer tests shall be made at the _____, unless otherwise agreed between the manufacturer and the purchaser.
- consumer's works
 - manufacturer's works
 - Third-party's place
 - All of these
- 1000 According to IS 2026: Part_1, If required than test results are to be corrected to a reference temperature _____ °C for oil-immersed transformers.
- 40
 - 50
 - 60
 - 75
- 1001 According to IS 2026: Part_1, different testes performed are mainly classified into _____ categories.
- Two
 - Four
 - Six
 - One
- 1002 The tests done mainly on a prototype unit (any one unit) out of all manufactured units in a lot (same specification) is known as _____ Test.
- Type
 - Routine
 - Special
 - Commissioning
- 1003 The tests done mainly on each and every unit out of all manufactured units in a lot is known as _____ test.
- Type
 - Routine
 - Special
 - Commissioning
- 1004 If the tests are done as per _____ requirement to obtain special information useful to the user and specified in the tender is known as Special Test.
- customer
 - manufacturer
 - government
 - High court
- 1005 Which of the following test is performed to confirm assigned ratings, characteristics, main and basic design criteria of a production lot.
- Type

- b. Routine
c. Special
d. Commissioning
- 1006 Which of the following test is performed to confirm the operational performance of the individual unit in a production lot?
a. Type
b. Routine
c. Special
d. Commissioning
- 1007 _____ tests are performed to assess the condition of the transformer after installation and compare the test results with the factory test reports.
a. Type
b. Routine
c. Special
d. Commissioning
- 1008 Which of the following test is/are not performed at manufacturer premises?
a. Type
b. Routine
c. Special
d. Commissioning
- 1009 Winding resistance measurement test is _____ test; It's also carried out as a commissioning and maintenance test.
a. Type
b. Routine
c. Special
d. General
- 1010 Winding resistance measurement is carried out to determine which of the following parameters?
a. Copper losses in transformer windings
b. the winding temperature at the end of the temperature rise test of transformer
c. inter-turn short circuit
d. All of these
- 1011 Winding resistance measurement is carried out after/during the following condition.
a. Manufacturing
b. Installation
c. Schedule & Un-schedule Maintenance
d. All of these
- 1012 Winding resistance measurement always done by passing _____ only.
a. direct current (DC supply)
b. alternating current (AC supply)
c. Both AC and DC
d. True RMS AC only
- 1013 Effective ac resistance is higher than the dc resistance due to _____.
a. Ferranti effect
b. corona effect
c. skin effect
d. All of these
- 1014 Effective AC resistance = _____ * measured DC resistance.
a. 1.1
b. 1.41
c. 1.73
d. Selected between 1.2 to 1.75
- 1015 Before winding resistance measurement the transformer shall be at rest in a constant ambient temperature for at least _____.
a. 1 hour
b. 2 hour
c. 3 hour
d. 1.5 hour
- 1016 _____ is the test measures the total resistance between any two points separated by a medium for resisting the flow of electrical current.
a. Insulation Resistance Test
b. Winding Resistance Test
c. PI Test
d. Dielectric Test

- 1017 What equipment is necessary for conducting insulation resistance tests?
- Megohmmeter
 - Temperature indicator
 - Humidity meter (not necessary if equipment temperature is above the dew point)
 - All of these
- 1018 The insulation resistance measurements are made for _____.
- IR between the transformer's windings & earth
 - IR between the transformer's windings
 - IR reference for future measurements
 - All of these
- 1019 The insulation resistance of the transformer is measured with a _____ ranged between _____ volts.
- DC Voltage, 1000 - 5000
 - AC Voltage, 1000 - 5000
 - DC Voltage, 5000 - 10000
 - AC Voltage, 5000 - 10000
- 1020 When do we need to multiply the correction factor with measured IR value in the transformer?
- IR measurement is done other than reference temperature.
 - IR measurement done during running condition
 - IR measurement done in moisture condition
 - IR measurement is done without guard terminal
- 1021 What is the difference between IR and PI test?
- both measured using a different measuring instrument
 - both measure different quantity
 - both measure Insulation resistance but PI measure along with time
 - None of these
- 1022 What extra we get by conducting PI test?
- Value of insulation resistance
 - the prediction regarding insulation life
 - Insulation resistance at different temperature
 - All of these
- 1023 Which value of PI indicates Good Insulation Condition?
- > 5 MΩ
 - > 10 MΩ
 - 44622
 - 44654
- 1024 Polarization Index Test (PI Value Test) along with Insulation Resistance Test (IR Value Test) is conducted on HV electrical machine to determine.
- Dryness and Cleanliness of the insulation
 - Service Condition & fitness of the insulation.
 - information about Life of Insulation
 - All of these
- 1025 When do we need to measure PI of Power transformer?
- Manufacturing
 - Installation
 - Schedule & Un-schedule Maintenance
 - All of these
- 1026 Which of the following ration of IR used to determine the value PI of Large Power Transformer?
- IR at 10 min to IR at 1 min
 - IR at 60 sec to IR at 15 sec
 - IR at 1 min to IR at 10 min
 - IR at 15 sec to IR at 60 sec
- 1027 What did we measure during the ratio test in a transformer?
- The no-load voltage ratio between the two windings of a transformer.
 - The full-load voltage ratio between the two windings of a transformer.

- c. IR60 to IR15 measurement of a transformer
d. number of turn of both the windings
- 1028 Why do we need to measure turns ration of the transformer?
a. to confirm order specifications
b. to examine the inter-turn short circuit
c. to verify all tap positions
d. All of these
- 1029 Which of the following is/are the method of turn's ratio measurement?
a. Standard Transformer method
b. Ratio Meter
c. Direct Measurement
d. All of these
- 1030 What should be the reason for General overheating (temperature rise above normal) in the transformer?
a. overloading
b. Low level of oil
c. Troubles in ventilation
d. All of these
- 1031 What should be the reason for low Secondary voltage in transformer?
a. Wrong Tapping selected
b. Low transformer oil
c. Low winding impedance
d. All of these
- 1032 What should be the reason for Unequal heating in the bank of transformer?
a. Improper tap changer position
b. Phase fault in either primary or secondary
c. The paralleled transformer may not share the load in proportion to their KVA rating
d. All of these
- 1033 What should be the reason for Noise in the transformer?
a. Fore fittings/nut bolts are loose
b. Tapping not set well
c. shorted turns
- d. All of these
- 1034 What should be the reason for Low insulation resistance b/w windings or b/w core & winding in a transformer?
a. more acidity in oil
b. Fore fittings/nut bolts are loose
c. This may be due to moisture, line surge or lightning discharges
d. All of these
- 1035 What should be the reason for Low dielectric strength of Oil in a transformer?
a. Moisture may be present
b. more acidity in the oil
c. shorted turns
d. All of these
- 1036 What should be the reason for corroded Transformer tank?
a. more acidity in the oil
b. Moisture may be present in oil
c. shorted turns
d. All of these
- 1037 Which of the followings is/are Prior steps of commissioning of the transformer?
a. Fill up accessories & oil up to level
b. Connecting line cable & Earthing to be checked for proper connector
c. Check Cooling system, Protection relays & tap position
d. All of these
- 1038 Which of the followings is/are Prior steps of commissioning of the transformer?
a. Check Insulation & Earth resistance
b. Clean bushings
c. Check Breather's conditions/silica gel be dry and blue in colour
d. All of these
- 1039 Which of the following parameters is/are checked hourly in a transformer?
a. Voltage & Current
b. Power
c. Temperature

- d. All of these
- 1040 Which of the following parameters is/are checked Daily in a transformer?
- Dehydrating breather
 - Parameters like Voltage, Current, Power & Temp
 - Bushings
 - All of these
- 1041 Which of the following parameters is/are checked Monthly in a transformer?
- Parameters like Voltage, Current, Power and Temp.
 - Oil level in transformer
 - Non-conservator transformer
 - All of these
- 1042 Which of the following parameters is/are checked Quarterly in a transformer?
- Dehydrating breather
 - Bushings
 - Earth resistance
 - All of these
- 1043 Which of the following parameters is/are checked Half-yearly in a transformer?
- Oil level in transformer
 - Non-conservator transformer
 - Non-conservator
 - All of these
- 1044 Which of the following parameters is/are checked Yearly in a transformer?
- Earth resistance
 - Relays, alarms, their circuits etc.
 - Oil BDV in the transformer
 - All of these
- 1045 When do we need to Filter the oil regardless of its condition?
- Monthly
 - Half-yearly
 - Yearly
 - After 2 year
- 1046 The_____determines the direction of the secondary current in relation to the primary current.
- Voltage Ratio
 - polarity
 - Phaser Group
 - All of these
- 1047 The polarity of a current transformer is determined by,
- the direction in which the coils are wound around the core of the CT (clockwise or counterclockwise)
 - by which way the secondary leads are brought out of the transformer case.
 - Both of these
 - None of these
- 1048 CT polarity is sometimes indicated with an arrow. These CTs should be installed with the arrow pointing in the direction of_____.
- current flow (source to load)
 - current flow (load to source)
 - Power flow (source to load)
 - Power flow (load to source)
- 1049 On subtractive polarity transformers, the H1 primary lead and the X1 secondary lead are on the_____of the transformer.
- opposite side
 - same side
 - Any side
 - All of these
- 1050 Wrong connection of the current transformers can cause
- wrong power measurement
 - false operation of the protection relays
 - Both of these
 - None of these
- 1051 Which of the following equipment is/are required for polarity check of CT?
- 9 volt Battery
 - Switch