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KPCL
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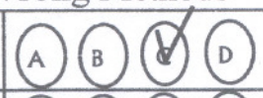
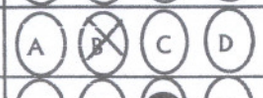
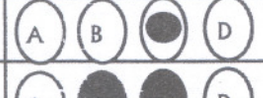
Application Number

Q

KPCL (Electrical Engineering – AE)

GENERAL INSTRUCTIONS

Time: 2 hrs **Max. Marks: 100**

EXAMPLE Wrong Methods	
1	
2	
3	
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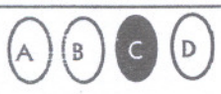
CORRECT METHOD	
1	

1. **Completely darken only one oval corresponding to the answer of your choice.**
2. **Use Black ink Ball-Point Pen only, to darken the oval to indicate your choice. Oval should be darkened completely so that the alphabet inside the oval is not visible**
3. **Mark your answer as shown in the example.**

1. The question paper is in two parts. PART-A containing 70 questions of **ONE** mark each is compulsory. PART-B has two sections. Each section contains 30 questions of **ONE** mark each. Attempt only one section in PART-B.
2. All questions are of objective type. There is no negative marking.
3. Questions must be answered on a special machine gradable **O**bjective **R**esponse **S**heet (ORS) by darkening the appropriate oval (marked A, B, C, D). **See box above**.
4. Enter your application number on the left top side of the **ORS** by darkening the appropriate oval with a Black ink Ball-Point Pen.
5. Write your name and the application number on the right top side of the **ORS** in the specified locations in black ink and affix your signature in the box provided.
6. No charts or tables are provided in the examination hall. Calculators, cell phones and other types of electronic gadgets are strictly forbidden in the examination hall.
7. Use the blank pages provided at the end of the question paper for rough work. No extra sheets will be provided.
8. After completing the examination, you must hand over both the question paper and the **ORS** answer sheet to the invigilator.
9. A candidate found violating the instructions given above and/or those given by the invigilator, will be disqualified. Furthermore, a candidate giving assistance to any other candidate or seeking/receiving help from any source in answering questions or copying in any manner in the test, will forfeit his/her chance of being considered for selection.

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PART- A

This part, containing 70 questions of ONE mark each, is to be attempted by all the candidates.

1) $\frac{d^2y}{dx^2} = \left[1 + x\left(\frac{dy}{dx}\right)^5\right]^{1/3}$ is equation of

(A) second order and third degree
(B) second order and zero degree
(C) second order and 0.333 degree
(D) first order and second degree

2) The value of $\left[\lim_{x\to\infty} \frac{\sin x}{x}\right]$ is

(A) ∞
(B) 1
(C) 0
(D) $-\infty$

3) If $A^{-1} = \begin{bmatrix} 0 & 0 & 1 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \end{bmatrix}$, the value of $|A|$ is

(A) 0
(B) 1
(C) 2
(D) -1

4) For which value of x, will the matrix $\begin{bmatrix} 8 & x & 0 \\ 4 & 0 & 2 \\ 12 & 6 & 0 \end{bmatrix}$ become singular?

(A) 4
(B) 6
(C) 8
(D) 12

5) For low head and high discharge, the hydraulic turbine used is
(A) Francis turbine
(B) Kaplan turbine
(C) Pelton wheel
(D) None of the above

6) Low grade fuels have
(A) low moisture content
(B) low ash content
(C) low calorific value
(D) low carbon content

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7) The inductance of power transmission line increases with
(A) decrease in line length
(B) increase in diameter of conductor
(C) increase in load current carried by the conductors
(D) increase in spacing between the phase conductors

8) Corona loss can be reduced by the use of hollow conductors, because
(A) the current density is reduced
(B) the eddy current in the conductor is eliminated
(C) for a given cross-section, the radius of the conductor is increased
(D) of better ventilation in the conductor

9) Gauss-Seidel iterative method can be used for solving a set of
(A) linear differential equations only
(B) linear algebraic equations only
(C) both linear and nonlinear algebraic equations
(D) both linear and nonlinear differential equations

10) Ring main distribution system is preferred to a radial system, because
(A) it is less expensive
(B) voltage drop in the feeder is less
(C) power factor is higher
(D) supply is more reliable

11) When a line to ground fault occurs, the current in the phase is 100A. The zero sequence current in this case will be
(A) zero
(B) 33.3 A
(C) 66.6 A
(D) 100 A

12) The operation of the relay which is most affected due to arc resistance is
(A) Mho relay
(B) Reactance relay
(C) Impedance relay
(D) All are equally affected

13) Load flow study is carried out for
(A) load frequency control
(B) stability studies
(C) system planning
(D) fault calculations

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14) The X/R ratio of 220 kV line as compared to 400 kV line
(A) is equal
(B) is smaller
(C) is greater
(D) can be greater or smaller

15) The insulation of the modern EHV lines is based on
(A) Radio interference
(B) The lightning voltage
(C) Corona
(D) The switching voltage

16) In order to have lower cost of electrical energy generation:
(A) The load factor and diversity factor should be low
(B) The load factor should be low but diversity factor high
(C) The load factor should be high but diversity factor low
(D) The load factor and diversity factor should be high

17) A lightning arrester connected between the line and earth in a power system
(A) protects the terminal equipment against traveling surges
(B) protects the transmission line against direct lightning stroke
(C) suppresses high frequency oscillations in the line
(D) reflects back the traveling wave approaching it

18) The voltages at the two ends of a line are 400 kV and its reactance is 320 ohms. The power transfer capacity of the line is

(A) 1600 MW
(B) 625 MW
(C) 320 MW
(D) 500 MW

19) Shunt capacitive compensation in distribution networks is mainly to
(A) reduce the fault level
(B) reduce harmonics
(C) as a substitute for synchronous phase modifier
(D) improve the voltage

20) The maximum demand of a consumer is 2 MW and his daily energy consumption is 2400 kWhr units. His load factor is
(A) 0.05
(B) 0.48
(C) 0.10
(D) 0.24

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21) Among the following type of power station, the power station having the least running cost per MWh is:
(A) Nuclear power plant
(B) Hydro-electric power plant
(C) Diesel power plant
(D) Thermal power plant

22) Steady state stability of power system is improved by
(A) reducing fault clearing time
(B) using double circuit line instead of single circuit line
(C) single pole switching
(D) decreasing generator inertia

23) In HVDC converter station equipment using thyristors, it is necessary to use a large number of thyristors in series because
(A) voltage ratings of thyristors are low
(B) current ratings of thyristors are low
(C) thyristors always fail to an internal open circuit
(D) voltage ratings of thyristors are high

24) Arcing in transmission line is prevented by connecting a suitable
(A) inductor in the neutral
(B) circuit breaker
(C) protective relay
(D) capacitor in the neutral

25) In a thermal power plant, the feed water coming to the economiser is heated using
(A) L.P. steam
(B) flue gases
(C) H.P. steam
(D) direct heat in the furnace

26) The surge impedance loading (SIL) of a transmission line is proportional to
(A) V^2
(B) V
(C) $\frac{1}{\sqrt{V}}$
(D) $\sqrt{V}$

27) For power generation by windmills, the generator used is of the type
(A) synchronous generator
(B) induction generator
(C) d.c. generator
(D) alternator

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28) Flexible a.c. transmission systems (FACTS) are mainly used
(A) for enhancing the line power transmission
(B) to minimise the harmonics in the system
(C) to improve the protection of transmission lines
(D) to reduce corona effect on transmission lines

29) The present day deregulation in power sector has the main purpose:
(A) to minimise harmonics in the system
(B) private participation in generation, transmission and distribution
(C) to improve the reliability of power system
(D) to encourage solar power generation

30) For complete protection of a three-phase line, minimum relays required are:
(A) three-phase and three-earth fault relays
(B) two-phase and two-earth fault relays
(C) two-phase and one-earth fault relays
(D) three-phase and two-earth fault relays

31) In a 3-step distance protection, the reach of the three zones of the relay at the beginning of the first line typically extends up to
(A) 100% of the first line, 50% of the second line and 20% of the third line
(B) 50% of the first line, 50% of the second line and 20% of the third line
(C) 80% of the first line, 20% of the second line and 10% of the third line
(D) 100% of the first line, 20% of the second line and 10% of the third line

32) The inductance of a line is minimum when
(A) GMD is high
(B) GMR is high
(C) Both GMD and GMR is high
(D) GMD is low and GMR are high

33) The voltage V= 90 cos (ωt -161.5°) can be represented as sine function by
(A) 90 sin (ωt + 71.5°)
(B) 90 sin (ωt + 18.5°)
(C) 90 sin (ωt - 71.5°)
(D) 90 sin (ωt - 18.5°)

34) The advantage of providing damper winding in alternators is
(A) to eliminate harmonic effects
(B) to provide a low resistance path for currents due to unbalancing of voltage
(C) to reduce oscillations when two alternators operate in parallel
(D) all of the above

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35) An ideal synchronous motor has no starting torque because the
(A) relative velocity between the stator and the rotor emf's is not zero
(B) relative velocity between the stator and the rotor emf's is zero
(C) rotor is made of salient poles
(D) rotor winding is highly reactive

36) Skew is used in induction motors in order to reduce torque due to
(A) time harmonics
(B) slot harmonics
(C) space harmonics
(D) reverse rotating fields

37) When the supply voltage of an induction motor is reduced by 10%, the maximum torque will decrease by approximately
(A) 5 %
(B) 10%
(C) 20%
(D) 40%

38) A 3-phase slip-ring induction motor is wound for 4 poles on stator and 6 poles on rotor. When 3-phase balanced voltage source at 50 Hz is applied to the motor, it will run at
(A) 750 rpm
(B) 1000 rpm
(C) 1500 rpm
(D) zero speed

39) Power input to a transformer on no load at rated voltage comprises predominantly
(A) copper loss
(B) hysteresis loss
(C) core loss
(D) eddy current loss

40) Auto-transformer is used in transmission and distribution
(A) when operator is not available
(B) when iron losses are to be reduced
(C) when efficiency considerations can be ignored
(D) when transmission ratio is small

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41) The laws of electromagnetic induction (Faraday's and Lenz's law) are summarized in which of the following equations?

(A) $e = iR$

(B) $e = \frac{di}{dt}$

(C) $e = -\frac{d\psi}{dt}$

(D) none of the above

42) During hunting of synchronous motor

(A) negative phase sequence currents are generated

(B) harmonics are generated in the armature circuit

(C) damper bar develops torque

(D) field excitation increases

43) Synchronous motor speed is controlled by varying

(A) field excitation

(B) supply voltage

(C) supply frequency only

(D) both supply voltage and frequency

44) In a salient pole synchronous machine, if d = direct axis, q = quadrature axis, E_f = excitation emf,

(A) I_d and I_q are both in phase with E_f

(B) I_q is in phase with E_f and I_d at 90^0 to E_f

(C) I_q is at 90^0 to E_f and I_d is in phase with E_f

(D) I_d and I_q are at 90^0 E_f

45) Slip test is performed to determine

(A) slip

(B) direct axis reactance and quadrature axis reactance

(C) positive sequence reactance and negative sequence reactance

(D) sub-transient reactance

46) A 10 pole 25 Hz alternator is directly coupled to and driven by a 60 Hz synchronous motor. Then the number of poles in a synchronous motor are

(A) 48 poles

(B) 12 poles

(C) 24 poles

(D) none of the above

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47) The most appropriate operating speed in rpm of generators used in Thermal, Nuclear and Hydro power plants could be
(A) 3000, 300 and 1500
(B) 3000, 3000 and 300
(C) 1500, 1500 and 3000
(D) 300, 300 and 3000

48) The major cause of creeping in an energy meter is
(A) over compensation for friction
(B) mechanical vibrations
(C) excessive voltage across potential coil
(D) stray magnetic fields

49) The ratio error in the CT is attributed to
(A) power factor of the primary
(B) exciting current
(C) wattless component of the current in the primary
(D) leakage flux

50) Form factor of an a.c. quantity is given by
(A) Peak value / R.M.S. value
(B) R.M.S. value / Maximum value
(C) Average value / Peak value
(D) R.M.S. value / Average value

51) The temperature coefficient of resistance α is defined as
(A) $\alpha = R\frac{dR}{dT}$
(B) $\alpha = \frac{1}{R}\frac{dT}{dR}$
(C) $\alpha = \frac{1}{R}\frac{dR}{dT}$
(D) $\alpha = R\frac{dT}{dR}$

52) For an increase of power level from 13 watts to 26 watts, the gain in db is
(A) 2
(B) 8
(C) 1
(D) 3

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53) When the distance between two charges is doubled, the force between them will be
(A) Double
(B) Half
(C) Four times
(D) One fourth

54) The ratio arm is used in bridge method of measurement basically:
(A) to reduce the error due to errors in known resistances
(B) to simplify calculations
(C) to divide the value of the resistance
(D) to speed up the response time for balancing

55) Two coils in differential connection have self inductance of 2 mH and 4 mH and a mutual inductance of 0.15 mH. The equivalent impedance of the combination is
(A) 5.7 mH
(B) 5.85 mH
(C) 6 mH
(D) 6.15 mH

56) Two incandescent light bulbs of 40W and 60W rating are connected in series across the mains. Then
(A) the bulbs together consume 100W
(B) the bulbs together consume 50W
(C) the 60W bulb glows brighter
(D) the 40W bulb glows brighter

57) If each branch of delta circuit has impedance $\sqrt{3}\,Z$, then each branch of the equivalent Wye circuit has impedance
(A) $\frac{Z}{\sqrt{3}}$
(B) 3 Z
(C) $3\sqrt{3}\,Z$
(D) $\frac{Z}{3}$

58) Voltage gain of an amplifier when it feeds a resistive load is 40 dB. The magnitude of the output voltage for the input signal of 10 mV is,
(A) 10 V
(B) 100 V
(C) 1 V
(D) 0.1 V

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59) The properties of a medium are
(A) Permeability, flux, magnetism
(B) Permittivity, permeability
(C) Permeability, inductivity, resistivity
(D) Permittivity, permeability, conductivity

60) Linear phase response of a filter means
(A) introducing equal time delay to all frequencies
(B) introducing time delay which is proportional to the frequency of the signal
(C) introducing time delay which is proportional to the amplitude of the signal
(D) introducing a linearly increasing time delay

61) The characteristic equation of a feedback control system is $2s^4 + s^3 + 3s^2 + 5s + 10 = 0$. The number of roots in the right half of s-plane are
(A) 2
(B) 3
(C) 1
(D) 0

62) In a low pass filter, the cut-off frequency is represented by the point where the ratio of output voltage to input voltage is
(A) 0.636
(B) $\frac{1}{3}$
(C) $\frac{1}{\sqrt{2}}$
(D) $\frac{1}{\sqrt{3}}$

63) Tunnel diode is used for
(A) microwave frequencies
(B) very low frequencies
(C) radio frequencies
(D) zero frequency

64) Schmitt trigger circuits are used for
(A) reducing the noise
(B) increasing gain
(C) improving the rise time
(D) none of the above

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65) Which of the amplifier has the lowest efficiency?
(A) Class A
(B) Class B
(C) Class AB
(D) Class C

66) Conversion of decimal value of 13.8125 in digital form is
(A) 1101.1101
(B) 1101.1011
(C) 1011.1111
(D) 1011.1011

67) Decimal equivalent of hexadecimal number $(43.4)_{16}$ is
(A) $(86.2)_{10}$
(B) $(31.25)_{10}$
(C) $(67.64)_{10}$
(D) $(67.25)_{10}$

68) 1 Megabyte is equivalent to
(A) 2^{16} bytes
(B) 2^{20} bytes
(C) 2^{10} bytes
(D) 2^{12} bytes

69) An emitter follower has high input impedance because
(A) large load resistance may be used
(B) large biasing resistance is used
(C) there is negative feedback in the base emitter circuit
(D) large emitter resistance is used

70) An amplifier with largest bandwidth is
(A) Transformer coupled amplifier
(B) RC coupled amplifier
(C) Differential amplifier
(D) Direct coupled amplifier

PART – B

In Part B, there are TWO Sections. Each Section contains 30 questions of ONE mark each. Attempt only ONE of these two Sections (Section A is expected to be answered by the Electrical Engineering candidates and Section B by the Electronics/Electronics and Communication Engineering candidates).
Indicate the Section attempted by darkening the appropriate bubble in the Answer Sheet.

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SECTION A

71) A series R-L-C circuit will have unity power factor , if operated at a frequency,
(A) $1/2\pi\sqrt{LC}$
(B) $1/\pi\sqrt{LC}$
(C) $1/\sqrt{LC}$
(D) $1/LC$

72) Which of the following harmonic voltage components in a 3-phase system would be in phase with each other.
(A) 2^{nd}, 4^{th}, 6^{th}, etc
(B) 3^{rd}, 9^{th}, 15^{th}, etc
(C) 5^{th}, 11^{th}, 17^{th}, etc
(D) 7^{th}, 13^{th}, 19^{th} etc

73) The magnitude of the induced e.m.f. in a conductor depends on the,
(A) flux density of the magnetic field
(B) rate of change of flux-linkages
(C) amount of flux cut
(D) amount of flux linkages

74) The $\frac{X}{R}$ ratio of a 400 kV transmission line is approximately
(A) 1.0
(B) 4.0
(C) 12.0
(D) 48.0

75) Maxwell's loop current method of solving electrical networks uses,
(A) Kirchhoff's voltage law
(B) branch currents
(C) network reduction
(D) single-loop circuits

76) Use of bundled conductors in E.H.V transmission systems will lead to :
(A) lower the inductance
(B) increase the inductance
(C) increases corona loss
(D) increase radio inference

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77) For measurement of temperatures above 1500 degrees K, the instrument can be used is:
(A) Mercury thermometer
(B) Gas thermometer
(C) Thermo-electric pyrometer
(D) Thermo-couple Ammeter

78) Insulation resistance of a cable is usually measured with the help of
(A) Digital multimeter
(B) Avometer
(C) Megger
(D) Kelvin bridge

79) If the inertia constant H of machine of 500MVA is 2 p.u. on its own base, its value corresponding to 100MVA base will be
(A) 50.0 p.u.
(B) 10.0 p.u.
(C) 0.8 p.u
(D) 0.4 p.u.

80) An unexcited single phase synchronous motor is :
(A) reluctance motor
(B) universal motor
(C) repulsion motor
(D) a.c series motor

81) The damping winding in a synchronous motor is generally used to:
(A) improve the power factor range
(B) reduce noise level
(C) reduce eddy currents
(D) prevent hunting and provide the starting torque

82) A dc generator running at 1600 rpm gives 240 V dc. If the speed is dropped to 1400 rpm without change of flux, the new emf will be :
(A) 210 V
(B) 237 V
(C) 240 V
(D) 270 V

83) The material, which cannot be used as a moderator in a nuclear power plant is:
(A) Sea water
(B) Heavy water
(C) Graphite
(D) Beryllium

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84) V-curves for a synchronous motor represent the relation between,
(A) field current and speed
(B) field current and power factor
(C) power factor and speed
(D) armature current and field current

85) A current transformer (C.T) has 5-turn primary and 1000-turn secondary and is used to measure line a.c current with the help of a standard 5A a.c ammeter. With this arrangement if the ammeter reading is 4A, the line current will be:
(A) 1600A
(B) 800A
(C) 400A
(D) 100A

86) The transmission capacity of a line operating at 50Hz is 450MW. If the line is operated at 60 Hz, the line capacity will be:
(A) 648 MW
(B) 540 MW
(C) 375 MW
(D) 322.5 MW

87) The voltages at the two ends of a line are 400 kV and its reactance is 64 ohms. The maximum power transfer limit of the line is
(A)2500 MW
(B) 25600 kW
(C)10826 kW
(D) 6250 kW

88) The addition of a synchronous compensator in the system
(A) decreases system stability
(B) has no effect on system stability
(C) improves system stability
(D) decreases fault level

89) The system is said to be effectively grounded if,
(A) $\frac{X_0}{X_1} > 3.0$
(B) neutral is grounded directly
(C) $\frac{X_0}{X_1} < 3.0$
(D) $\frac{R_0}{X_1} > 2.0$

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90) The positive sequence component of voltage at the point of fault is zero when it is a
(A) L-G fault
(B) L-L fault
(C) L-L-G fault
(D) 3-phase fault

91) In an inverse definite minimum time, electromagnetic type over-current relay, the minimum time feature is achieved because of
(A) electromagnetic damping
(B) appropriate time delay element
(C) proper mechanical design
(D) saturation of the magnetic circuit

92) MHO relay is used for the protection of
(A) distribution transformers
(B) high horse power induction motors
(C) long transmission lines
(D) small size generators

93) Static VAR compensators in EHV system are mainly used to
(A) Minimize harmonics
(B) Economical VAR compensation
(C) Improve stability
(D) Improve frequency

94) A line of surge impedance 400 ohms is terminated by a resistance of 400 ohms. The reflected quantities are
(A) equal to incident quantities
(B) half the incident quantities
(C) 1
(D) 0

95) The insulation strength of EHV lines is mainly governed by
(A) Power frequency over-voltages
(B) Harmonics
(C) Switching over-voltages
(D) Corona

96) The corona loss in a 60 Hz system is 0.24 kW per phase per km. At a frequency of 50 Hz, the corona loss in kW per phase per km will be:
(A) 0.1667
(B) 0.20
(C) 0.288
(D) 0.3456

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97) HVDC transmission is essential in the following case of interconnection of systems with
(A) Different frequencies
(B) Short distance transmission
(C) Medium distance transmission
(D) Long distance transmission

98) The maximum demand of a consumer is 6 kW and his daily energy consumption is 36 units. His load factor is
(A) 6.0
(B) 4.0
(C) 0.25
(D) 0.1667

99) The flicker effect of fluorescent lamp is more pronounced at
(A) High voltage
(B) High frequency
(C) Low voltage
(D) Low frequency

100) Among the following places, the place not associated with a hydro plant is:
(A)Idikki (Kerala)
(B) Kaiga (Karnataka)
(C) Koyana(Maharashtra)
(D) Hirakud(Orissa)

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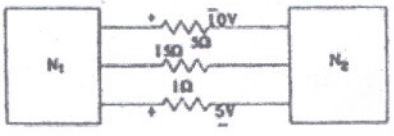
SECTION B

71) A Network contains linear resistors and ideal voltage sources. If values of all the resistors are doubled, then the voltage across each resistor is

(A) Halved
(B) Doubled
(C) Increased by four times
(D) Not changed

72) The two electrical sub networks N_1 and N_2 are connected through three resistors as shown in the figure. The voltage across 5 ohm resistor and 1 ohm resistor are given to be 10V and 5 V, respectively. Then voltage across 15 ohm resistor is



(A) -105 V
(B) +105V
(C) -15V
(D) +15V

73) Consider a transmission line of characteristic impedance of 50 ohm. Let it be terminated at one end by +j50 ohm. The VSWR produced by it in the transmission line will be

(A) +1
(B) 0
(C) ∞
(D) +j

74) Boolean expression for the output of XNOR (Equivalent) logic gate with inputs A and B is

(A) $A\bar{B} + \bar{A}\,B$
(B) $\overline{AB} + AB$
(C) $(\bar{A} + B)(A + \bar{B})$
(D) $(\bar{A} + \bar{B})(A + B)$

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75) The Fourier Series of a odd periodic function, contains only
(A) Odd harmonics
(B) Even harmonics
(C) Cosine terms
(D) Sine terms

76) PLA can be used
(A) As a Microprocessor
(B) As a dynamic memory
(C) To realise a sequential logic
(D) To realise a combinational logic

77) $V(t)= 5 [\cos(106 \pi t) - \sin(103\pi t) * \sin (106 \pi t)]$ represents
(A) DSB suppressed carrier signal
(B) AM signal
(C) SSB upper sideband signal
(D) Narrow band FM signal

78) Medium wave radio signals may be received at far off distances at night because
(A) Radio waves travel faster at night
(B) Ground wave attenuation is low at night
(C) The sky wave is stronger at night
(D) There is no fading at night

79) A ramp voltage , v(t)=100 volts, is applied to an RC differentiating circuit with R= 5kΩ and c= 4 μF. The maximum output voltage is
(A) 0.2 volts
(B) 2.0 volts
(C) 10.0 volts
(D) 50.0 volts

80) The threshold voltage of an n channel MOSFET can be increased by
(A) Increasing the channel dopant concentration
(B) Reducing the channel dopant concentration
(C) Reducing the gate-oxide thickness
(D) Reducing the channel length

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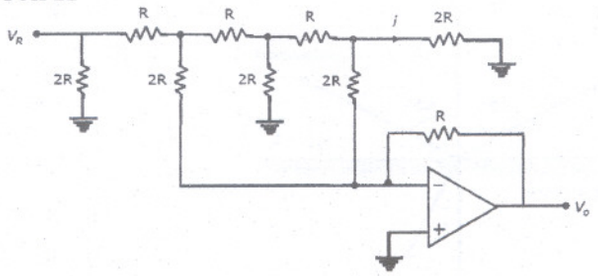
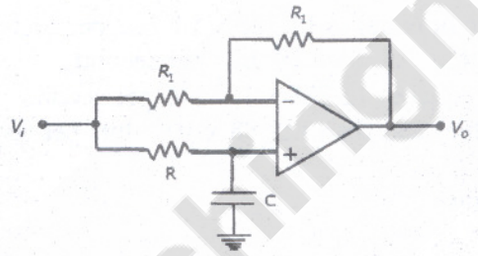
81) In the digital to analog converter circuit shown in the figure below, $V_r = 10V$ and $R = 10k\ \Omega$



The voltage V_0 is

(A) -0.781 V
(B) -1.562 V
(C) -3.125 V
(D) -6.250 V

82) Consider the operational amplifier circuit shown in the figure



The transfer function of $V_0(s)/ V_i(s)$ is

(A) $\frac{1-sRC}{1+sRC}$

(B) $\frac{1+sRC}{1-sRC}$

(C) $\frac{1}{1-sRC}$

(D) $\frac{1}{1+sRC}$

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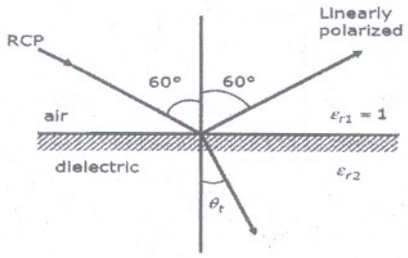
83) A right circularly polarized (RCP) plane wave is incident at an angle of 60^0 to the normal, on an air dielectric interface. If the reflected wave is linearly polarized, the relative dielectric constant ϵ_{r2} is :

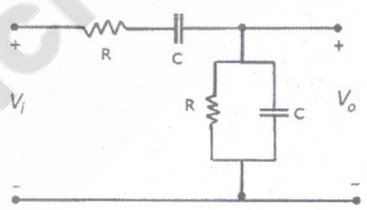


(A) $\sqrt{2}$
(B) $\sqrt{3}$
(C) 2
(D) 3

84) In a Direct Sequence CDMA system the chip rate is 1.2288×10^6 chips per second. If the processing gain is desired to be at least 100, the data rate

(A) Must be less than or equal to 12.288×10^3 bits per second
(B) Must be greater than 12.288×10^3 bits per second
(C) Must be exactly equal to 12.288×10^3 bits per second
(D) Can take any values less than 122.88×10^3 bits per second

85) In the RC circuit shown below



(A) low pass filter
(B) A high pass filter
(C) A band pass filter
(D) A band reject filter

86) The electron and hole concentrations in an intrinsic semiconductor are n_i per cm^3 at 300 K. Now if acceptor impurities are introduced with a a concentration of n_a cm^3 where ($n_a >> n_i$), the electron concentration per at 300K will be :

(A) n_i
(B) $n_i + n_a$
(C) $n_a - n_i$
(D) $\frac{n_i^2}{n_a}$

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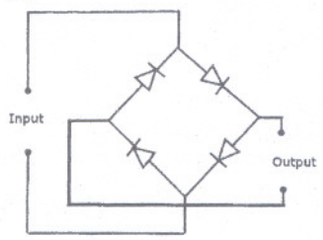
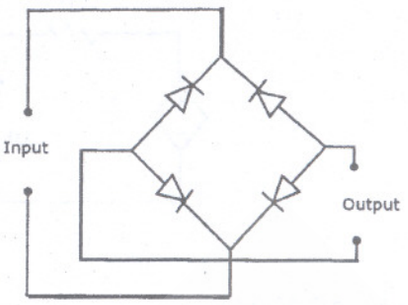
87) The correct full wave circuit is

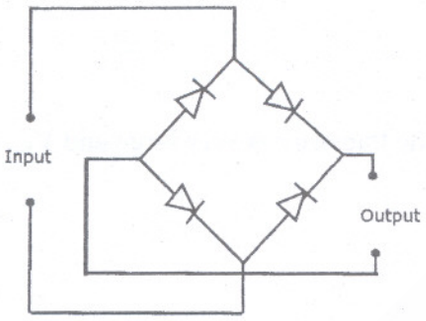
(A)



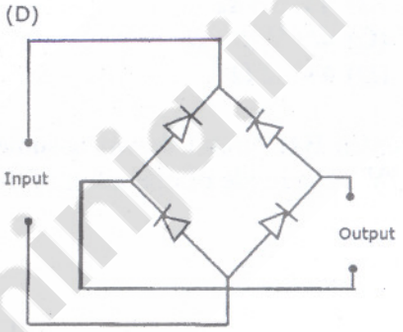
(B)



(C)



(D)



88) In a trans-conductance amplifier, it is desirable to have
- (A) A large input resistance and a large output resistance
- (B) A large input resistance and a small output resistance
- (C) A small input resistance and a large output resistance
- (D) A small input resistance and a small output resistance

89) X= 01110 and Y = 11001 are two 5- bit binary numbers represented in two's complement format. The sum of X and Y represented in two's complement format using 6 bits is
- (A) 100111
- (B) 001000
- (C) 000111
- (D) 101001

90) If the closed loop transfer function of a control system is given as $T(s)=\frac{s-5}{(s+2)(s+3)}$, then it is
- (A) An unstable system
- (B) An uncontrollable system
- (C) A minimum phase system
- (D) A non minimum phase system

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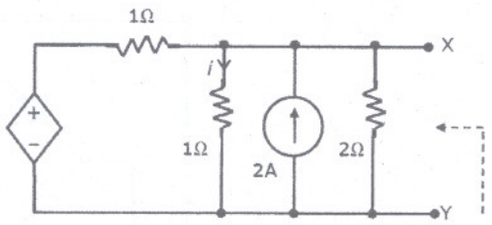
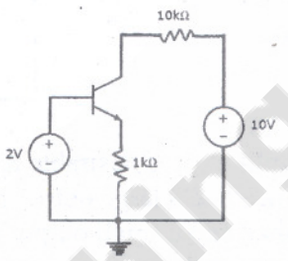
91) For the circuit shown below the thevenin voltage and resistance looking into x-y are



(A) 4/3 V, 2 Ω
(B) 4V, 2/3 Ω
(C) 4/3 V, 2/3 Ω
(D) 4V , 2 Ω

92) For the BJT circuit shown, assume that the β of the transistor is very large and V_{BE} = 0.7V . The mode of operation of the BJT is:



(A) Cut-off
(B) Saturation
(C) Normal active
(D) Reverse active

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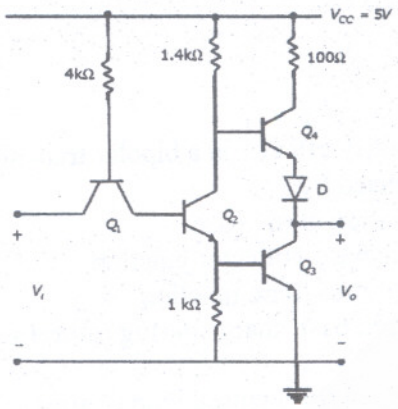
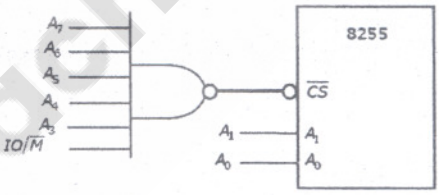
93) The circuit diagram of a standard TTL NOT gate is shown in the figure.When V_i =2.5V, the modes of operation of the transistor will be:



(A) Q_1 : reverse active , Q_2 : normal active, Q_3 : saturation, Q_4: cut off
(B) Q_1 : reverse active, Q_2 : saturation, Q_3 : saturation, Q_4: cut off
(C) Q_1 : normal active , Q_2 : cut off , Q_3: cut off , Q_4 : saturation
(D) Q_1 : saturation, Q_2 : saturation, Q_3 : saturation, Q_4 : normal active

94) An 8255 chip is interfaced to an 8085 microprocessor system as in I/O mapped I/O as shown in the figure. The address lines A_0 and A_1 of the 8085 are used by the 8255 chip to deocde internally its three ports and the control register. The address lines A_3 to A_7 as well as the IO/M signal are used for address decoding. The range of address for which the 8255 chip would get selected is



(A) F8H - FBH
(B) F8H - FCH
(C F8H - FFH
(D) F0H - F7H

95) The rank of the matrix

$$\begin{matrix} 1 & 1 & 1 \\ 1 & -1 & 0 \\ 1 & 1 & 1 \end{matrix}$$

(A) 0
(B) 1
(C) 2
(D) 3

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96) A solution of the differential equation $x(t) + \dot{2}x(t) = \delta(t)$, with the initial condition x(0-)=0 is:
(A) $e^{-2t}u(t)$
(B) $e^{2t}u(t)$
(C) $e^{-t}u(t)$
(D) $e^{t}u(t)$

97) The phenomen known as "early effect " in a bipolar tranistor refers to a reduction of the effective base- width caused by
(A) Electron-hole recombination at the base
(B) The reverse biasing of the base-collector junction
(C) The forward biasing of emitter- base junction
(D) The early removal of stored base charge during saturation-to- cutoff switching

98) The nyquist plot of G(jω) H(jω) for a closed loop control system, passes through (-1,j0) point in the GH plane. The gain margin of the system in db is equal to
(A) infinite
(B) greater than zero
(C) less than zero
(D) zero

99) The transfer function of a phase- lead compensator is given by $G_c(s)= \frac{1+3Ts}{1+Ts}$ where T>0, The maximum phase-shift provided by such compensator is:

(A) $\frac{\pi}{2}$

(B) $\frac{\pi}{3}$

(C) $\frac{\pi}{4}$

(D) $\frac{\pi}{6}$

100) The unit impulse response of a system is :

$h(t)= e^{-t}, t \geq 0$

For this system, the steady-state value of the output for unit step input is equal to

(A) -1
(B) 0
(C) 1
(D) ∞

******END OF QUESTION PAPER*****

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Section A
Electrical

Q. Series

Answer Key of AEE-EEG 'Q' Series

QNO.	ANS	QNO.	ANS	QNO.	ANS	QNO.	ANS
1	A	26	A	51	C	76	A
2	C	27	B	52	D	77	C
3	B	28	A	53	D	78	C
4	A	29	B	54	A	79	B
5	B	30	C	55	A	80	A
6	C	31	C	56	D	81	D
7	D	32	D	57	A	82	A
8	C	33	C	58	C	83	A
9	B	34	D	59	D	84	D
10	B	35	A	60	A	85	A
11	B	36	B	61	A	86	C
12	A	37	C	62	C	87	A
13	C	38	A	63	A	88	C
14	B	39	C	64	C	89	C
15	D	40	D	65	A	90	D
16	D	41	C	66	A	91	D
17	A	42	C	67	D	92	C
18	D	43	D	68	B	93	C
19	D	44	B	69	C	94	D
20	A	45	B	70	D	95	C
21	B	46	C	71	A	96	B
22	B	47	B	72	A	97	A
23	A	48	C	73	B	98	C
24	A	49	B	74	C	99	D
25	B	50	D	75	A	100	C

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Section B
Electronics
'Q' Series

Answer Key of AEE-ECE 'Q' Series

QNO.	ANS	QNO.	ANS	QNO.	ANS	QNO.	ANS
1	A	26	A	51	C	76	D
2	C	27	B	52	D	77	D
3	B	28	A	53	D	78	C
4	A	29	B	54	A	79	B
5	B	30	C	55	A	80	B
6	C	31	C	56	D	81	C
7	D	32	D	57	A	82	A
8	C	33	C	58	C	83	D
9	B	34	D	59	D	84	A
10	B	35	A	60	A	85	C
11	B	36	B	61	A	86	D
12	A	37	C	62	C	87	C
13	C	38	A	63	A	88	A
14	B	39	C	64	C	89	C
15	D	40	D	65	A	90	D
16	D	41	C	66	A	91	D
17	A	42	C	67	D	92	B
18	D	43	D	68	B	93	B
19	D	44	B	69	C	94	C
20	A	45	B	70	D	95	C
21	B	46	C	71	D	96	A
22	B	47	B	72	A	97	B
23	A	48	C	73	C	98	D
24	A	49	B	74	D	99	D
25	B	50	D	75	D	100	C

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