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Model Paper 3

Electrical Engineering

1. A Gantt chart indicates

1. Balance of work done
2. Efficiency of project
3. Comparison of actual process with scheduled
4. Progress of project

2. How many roots of the following equation lie in the right-half of s-plane?
$2s^4+s^3+2s^2+5s+10=0$

1. 1
2. 2
3. 3
4. 4

3. Two watt meters are used to measure the power in a 3-phase balanced system. What is the power factor of the load when one wattmeter reads twice the other?

1. 0
2. 0.5
3. 0.866
4. 1

4. An analog voltage in the range of 0-8V is divided in eight intervals for conversion to 3-bit digital output. The maximum quantization error is

1. 0 V
2. 0.5 V
3. 1.0 V
4. 2.0 V

5. A CMOS amplifier when compared to an N channel MOSFET has the advantage of

1 Higher cutoff frequency

2 Higher voltage gain

3 Higher current gain

4 Lower power dissipation

6. Which effect is the converse of Peltier effect?

1. Seeback effect
2. Thomson effect
3. Hall effect
4. Joule effect

7. Magnetic materials which may be readily magnetized in either direction are

1. Soft magnetic materials
2. Hard magnetic materials
3. High eddy current loss materials
4. High hysteresis loss materials

8. Consider the following statements regarding a ferromagnetic material:

1.Below the ferromagnetic Curie temperature, the ferromagnetic materials exhibit hysteresis effect.

2.The coercive force is the filed required to reduce the flux density to zero.

Which of the above statements is/are correct?

1. Both 1 and 2
2. Neither 1 nor 2
3. 1 only
4. 2 only

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9. The impact ionization phenomenon in semiconductor may be viewed as the reverse process of

1. Radiative recombination
2. Auger recombination
3. Surface recombination
4. Shockley-Read-Hall recombination

10. Refractive index of a slice glass can be reduced by doping it with tiny amount of

1. GeO_2
2. B_2O_3
3. P_2O_{5x}
4. Al_2o_3

11. If a diameter of a copper wire is increased by two times keeping its terminal voltage same, then the drift velocity will

1. Become twice
2. Become half
3. ecome four times
4. Remain unchanged

Solution: 4

12. Which insulation is most widely used for covering wires/cables used in internal wiring ?

1. Paper
2. Wood
3. Glass
4. PVC

13. If the Q-factor of a coil at resonant frequency of 1.5 MHz is 150 for a series resonant circuit, then the corresponding bandwidth is

1. 225 MHz
2. 106 MHz
3. 50 kHz
4. 10 kHz

14. The number of p-n junctions in a thyristor (SCR) is/are:

1. 1
2. 2
3. 3
4. 4

15. In a two-wattmeter method of measuring power in a balanced 3-phase circuit, the ratio of the two wattmeter readings is 1 : 2. The circuit power

1. 0.707
2. 0.5
3. 0.866
4. Indeterminate

16. A balanced delta-connected load (16 + *j*12)Ω/phase is connected to a 3-phase 230 V balanced supply. The line current and the real power drawn respectively are

1. 19.9 A and 3.17 W
2. 11.5 A and 6.34 W
3. 19.9 A and 6.34 W
4. 11.5 A and 3.17 W

17. A balanced load of 5 + *j*4 is connected in delta. What is the impedance per phase of the equivalent star connection?

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1. $5 + j4$
2. $1.66 + j1.33$
3. $15 + j12$
4. $2.5 + j2$

18. A capacitive transducer consists of two parallel plates of diameter 2 cm and separated by an air gap of 0.25 mm. What is the displacement sensitivity?

1. +200 pF/cm
2. -300 pF/cm
3. -444 pF/cm
4. +44.4 pF/cm

19. A 3-turn 100 kΩ potentiometer with 1% linearity uses 30V supply. What is the potentiometer constant?

1. 0.1 V/turn
2. 10 V/turn
3. 33.33 V/turn
4. 0.3 V/turn

20. A single phase ac voltage source has 200V rms and a system connected consumes an active power of 300W. What is the reactive power consumed by the system if 2-5A rms current is drawn?

1. 100 VAR
2. 200 VAR
3. 200 VAR
4. 400 VAR

21. In a balanced 3-phase 200 V circuit, the line current is 115.5A. When the power is measured by two wattmeter method, one of the wattmeter reads 20 kW and the other one reads zero. What is the power factor of the load?

1. 0.5
2. 0.6
3. 0.7
4. 0.8

22. A memory system has a total of 8 memory chips, each with 12 address lines and 4 data lines. The total size of the memory system is

1. 32 k bytes
2. 48 k bytes
3. 64 k bytes
4. 6 k bytes

23. In 8085 microprocessor with memory mapped I/O, which one of the following is correct?

1. I/O devices have 16bit addresses
2. I/O devices are accesses during IN and OUT instructions
3. There can be a maximum of 256 input and 256 output devices
4. Logic operations cannot be performed

24. On simplification of expression $Y = \overline{(A.B + \overline{C})(\overline{A + B} + C)}$, using Boolean algebra, the solution is

1. $(A.B + C)(A + B.C)$
2. $(\overline{A} + \overline{B} + \overline{C})(A + B + C)$
3. $(A.B + \overline{C})(A.C + \overline{B})$
4. $(B.C + \overline{A})(A.B + \overline{C})$

25. The large signal bandwidth of an operational amplifier is limited by its

1. CMRR
2. Slew Rate

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3. Gain-bandwidth product
4. Input impedance

26. The minimum number of NAND gates required to implement the Boolean function A + AB̄ + AB̄C is equal to

1. 0
2. 3
3. 4
4. 6

27. What is the correct sequence when the logic families TTL, ECL, IIL and CMOS are arranged in descending order of fan-out capabilities?

1. CMOS, TTL, ECL and IIL
2. IIL, TTL, ECL and CMOS
3. IIL, ECL, TTL and CMOS
4. CMOS, ECL, TTL and IIL

28. The zeners incorporated within the encapsulations of some MOSFETs are meant for

1. Reducing the cost
2. Biasing the gate circuit
3. Self-protecting the device against transients
4. None of the above

29. When UJT is used for triggering an SCR, the wave-shape of the signal obtained from UJT circuit is

1. Sine wave
2. Saw tooth wave
3. Trapezoidal wave
4. Square wave

30. In a MOS capacitance fabricate on a P-type semiconductor, strong inversion occurs, when potential is

1. Equal to Fermi level
2. Zero
3. Negative and equal to Fermi potential in magnitude
4. Positive and equal to Fermi potential in magnitude

Solution: 4

31. Consider the following statements regarding optocouplers:

1.Optocouplers are LEDs driving photodiodes in a single package to provide electrical isolation between input and output

2.Optocouplers is LED driving a phototransistor in a single package that replaces pulse transformers working at input zero crossing

3.Optocouplers are used as temporary non fixed joints between optical fiber terminations

Which of the above statements are correct?

1. 1, 2 and 3
2. 1 and 2 only
3. 1 and 3 only
4. 2 and 3 only

32. Which of the following does not cause permanent damage to an SCR?

1. High current
2. High rate of rise of current
3. High temperature rise
4. High rate of rise of voltage

33. The logic function A + BC us the simplified form of which of the following?

1. AB +BC
2. $\overline{A}B + A\overline{B}C$
3. $\overline{ABC}$

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4. (A+B)(A+C)

34. Program counter in a digital computer

1. Counts the number of programs run in the machine
2. Counts the number of times a subroutine is called
3. Counts the number of times the loops are executed
4. Points the memory address of the current or the next instruction to be executed

35. Each cell of a static RAM contains

1. 4 MOS transistors
2. 4 MOS transistors and 1 capacitor
3. 2 MOS transistors
4. 4 MOS transistors and 2 capacitors

36. A 4-bit synchronous counter has flip-flops having propagation delay of 50 ns each and AND gates having propagation delay of 20 ns each. The maximum frequency of clock pulses can be

1. 20 MHz
2. 50 MHz
3. 14.3 MHz
4. 5 MHz

37. A self-starting-counter is one that can start

1. The sequence from initial count and continues its sequence
2. The sequence from any state among the sequence and continues its normal count sequence
3. From any state but eventually reaches the required count sequence
4. None of the above

38. If the z-transform of a system is given by

$$H(z) = \frac{\alpha + z^{-1}}{1 + \alpha z^{-1}}$$

Where α is real-valued, $|\alpha|<1$, ROC: $|z|>|\alpha|$ then the system is

1. A low-pass filter
2. A band-pass filter
3. An all-pass filter
4. A high-pass filter

39. Consider a discrete random system variable assuming finitely many values. The cumulative distribution function of such a random variable is

1. Non-increasing function
2. Non-decreasing function with finitely many discontinuities and assuming values less than one
3. Non-decreasing function without discontinuities
4. Non-decreasing function assuming values larger than one

40. A continuous random variable X has uncountably many values in the interval [a,b]. If C is a value in the interval [a,b], then P{X=C}

1. Is zero
2. Is strictly non-zero
3. Depends on the limits {a,b}
4. Is less than one, but non-zero

41. In the case of a random variable dealing with non-deterministic signals

1. It is a function from space of outcomes to the real/complex numbers
2. It is a function with the probabilities of outcomes

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as random numbers

3. The values assumed by signals are always deterministic
4. Sometimes the events associated with random variable are deterministic

42. Consider the following system function of a discrete-time LTI system:

$H(z)= \frac{z^{-1}- a^*}{1-\alpha z^{-1}}$

Where α^* is the complex conjugate of a. The frequency response of such a system is

1. Aperiodic; depends on frequency ω
2. Aperiodic; does not depend on frequency ω
3. periodic; depends on frequency ω
4. periodic; does not depend on frequency ω

43. A system is characterized by the input-output relationy (t) = x(2t) + x(3t) for all t, where y(t) is the output and x(t) is the input. It is

1. Linear and causal
2. Linear and non-causal
3. Non-linear and causal
4. Non-linear and non-causal

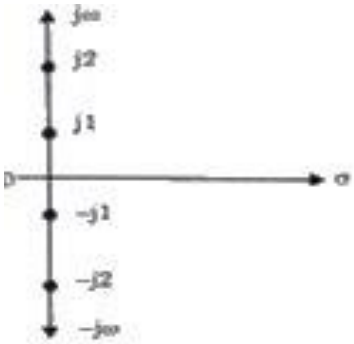
44. The z-transform X(z) of the signal X[n]= α^n u(n) Where u(n) is sequence of unit pulses, is

1. $\frac{\alpha}{z-1}$
2. $\frac{z}{z-1}$
3. $\frac{z}{z-\alpha}$
4. $\frac{1}{z-\alpha}$

45. The initial and final values of *f(t)* = 15 – 10t – $10e^{-20t}$ are respectively

1. 5 and ∞
2. 5 and -∞
3. 15 and ∞
4. 15 and 10

46. The pole-zero pattern of a certain filter is shown in figure. The filter must be



1. Low-pass type
2. High-pass type
3. Band-pass type
4. All-pass type

47. The transfer function of a low-pass RC network is

1. $RCs(1+RCs)$
2. $\frac{1}{(1+RCs)}$
3. $\frac{RC}{(1+RCs)}$

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4. $\frac{s}{(1+RCs)}$

48. A Hurwitz polynomial D(s) must satisfy two conditions. One is the polynomial is real when s is real. What is the other condition?

1. Roots of D(s) have real parts which are positive and non-zero.
2. Roots of D(s) have imaginary parts which are negative
3. Roots of D(s) have real parts which are either zero or negative
4. Roots of D(s) have real parts which are positive or zero

49. The speed control of dc shunt motor in both directions can be obtained by

1. Armature resistance control method
2. Ward Leonard method
3. Field diverter method
4. Armature voltage control method

50. A 10 hp, 240 V dc shunt motor, having armature-circuit resistance of 0.5 Ω and a full-load current of 40 A, is started by a starter, such that the sections of required resistance in series with the armature-circuit should limit the starting current to 150% of the full-load current. The steady-state emf developed by the machine at full-load when the arm of the starter is moved to the next step is

1. 120 V
2. 100 V
3. 80 V
4. 60 V

51. A synchronous motor operates at rated voltage and frequency and has a load torque angle of 30°. If both terminal voltage and frequency are reduced by 10%, then

1. The load torque Angle remain the same
2. The load torque Angle increases
3. The load torque Angle decreases
4. Nothing can be said about the torque angle

52. The flux/pole in a synchronous motor with stator not connected to supply is Φ_1 and when connected to supply it is $\frac{3}{4}\Phi_1$. The no-load current drawn from the supply under this condition would be

1. Lagging the supply voltage
2. Leading the supply voltage
3. In phase with the supply voltage
4. Zero

53. A cylindrical-rotor generator with internal voltage 1.0 pu and X_5 = 1.0 pu is connected by a line of reactance 0.5 pu to a round-rotor synchronous motor of synchronous reactance 1.2 pu and excitation voltage 1.35 pu. When 0.5 pu power is supplied by the generator, the electrical angular difference between the rotors would be

1. 25°
2. 30°
3. 60°
4. 120°

54. The synchronizing power for one mechanical degree of displacement for 3-phase, 20000 kVA, 6600 V, 50 Hz,12-pole machine having X_S = 1.65 Ω and negligible resistance is

1. 1024.6 kW
2. 921.9 kW
3. 782.6 kW
4. 1182.6 kW

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55. Equal area criteria in power systems is used in context of

1. Deciding maximum loading for a given excitation
2. Stability of a machine connected to infinite bus bar
3. Stability of power systems in which many machines are connected to infinite bus bar
4. Load distribution between a single machine and load drawn from to infinite bus bar

56. In a power system, which of the following is/are critical clearance time of a fault related to?

1.Transient reactance
2.Sub-transient reactance
3.Reactive power limit
4.Transient stability limit

1. 1 and 2
2. 2 only
3. 3 and 4
4. 4 only

57. A relay is connected to a 400/5 A current transformer and set for 150%. The primary fault current of 2400 A needs a plug setting multiplier of

1. 2
2. 4
3. 6
4. 8

58. The use of high speed circuit breakers

1. Reduces the short circuit current
2. Improves the system stability
3. Decreases the system stability
4. Increases the short circuit current

59. The advantage of hydro-electric power station over thermal power station is:

1. The initial cost of hydro-electric power station is low
2. The operating cost of hydro-electric power station is low
3. Hydro-electric power station can supply the power throughout the year
4. Hydro-electric power station can be constructed at the place where the energy is required

60. The incremental cost characteristics of two generators delivering 200 MW are as follows:

$\frac{dF_1}{dP_1} = 2.0 + 0.01P_1 \quad \frac{dF_2}{dP_2} = 1.6 + 0.02P_2$

For economic operation the generation of P_1 and P_2 should be:

1. 100 MW and 100 MW
2. 80 MW and 120 MW
3. 200 MW and 100 MW
4. 120 MW and 80 MW

61. In a single-phase to single-phase cyclo-convertor, the magnitudes of harmonic components are quite large. How can they be reduced?

1. By using a chopper circuit
2. By using an RC oscillator
3. By using a three phase input supply
4. By adding an alternator to the input

62. Which is the important factor in the steady-state characteristics of a MOSFET?

1. Current gain
2. Transconductance
3. Output resistance
4. Drain-source voltage

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63. A short in any type of circuit (series, parallel or combination) causes the total circuit

1. resistance to decrease
2. power to decreases
3. current to increase

Which of the above are correct?

1. 2 and 3
2. 2 and 4
3. 1 and 4
4. 1 and 3

64. An air-cored solenoid of 250 turns has a cross-sectional area A = 80 cm^2 and length l = 100 cm. The value of its inductance is

1. 0.425 mH
2. 0.628 mH
3. 0.751 mH
4. 0.904 mH

65. The current in a coil changes uniformly from 10 A to 1 A in half a second. A voltmeter connected across the coil gives a reading of 36 V. The self-inductance of the coil is

1. 0.5 H
2. 1 H
3. 2 H
4. 4 H

General Knowledge

66. The first weekly Benqali newspaper Samachar Darpan was published by

1. Harish Chandra Mukherjee
2. Dinabandhu Mitra
3. Marshman
4. Vidysagar

67. The English and the Dutch were firmly established in all the parts of the Coast from Sind to Bengal by the middle of the

1. 18^{th} century
2. 17^{th} Century
3. 16^{th} Century
4. 15^{th} Century

68. Saint Simon ,Charles Fourier and Robert Owen were:

1. Renaissance
2. Early socialist
3. Portuguese navigators
4. Activities in the American War of the Independence

69. The oldest mountains in India are

1. Nilgiri hills
2. Aravalis
3. Vindhyas
4. Satpuras

70. The temperature increases rapidly after:

1. Exosphere
2. Ionosphere
3. stratosphere
4. troposphere

71. Devaluation of a currency means

1. Fixing the value of the currency in conjuction with the movement in the value of a basket of predetermined currencies
2. reduction in the value of a currency vis-à-vis major internationally traded currencies
3. fixing the value of currency in multilateral consultaion with the IMF the World Bank and

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major trading partners

4. permitting the currency to seek its worth in the international market

72. Consider the following statements

1. Article 371 A to 371 were inserted in the Constitution of India to meet regional demands of Nagaland,Assam, Manipur, Andhra Pradesh, Sikkim, Mizoram, Arunachal Pradesh and Goa.

2. Constitution of India and the United States of America envisage a dual policy(The union and the states) but a single citizenship.

3. A Naturalised citizen of India can never be deprived of his citizenship.

Which of the statements(s) given above is/are correct?

1. Only 1
2. 1 and 3
3. Only 3
4. All of the above

73. Who established the State Depressed Classes Association in Hyderabad?

1. Arige Ramaswamy
2. Yathiraj
3. Bhagya Reddy Varma
4. B.S. Venkat Rao

74. Which of the following committee was appointed by the VII Nizam to suggest Constitutional Reforms ?

1. Ali Imam Committee
2. Aravamudu Iyengar Committee
3. Pingali Venkataram Reddy Committee
4. Mirza Yar Jung Committee

75. Which Landlord donated his lands during the Bhoodan Movement in Telangana ?

1. Visnuri Ramchandra Reddy
2. Katkuri Krishna Rao
3. Pingali Venkat Rao
4. Vedire Ramachandra Reddy

76. convex lens made of glass has focal length 0.15m in air. If the refractive index of glass is 3/2, and that of water is 4/3 the focal length of lens when immersed in water is

1. 0.45 m
2. 0.15 m
3. 0.30 m
4. 0.6 m

77. The one which decreases with dilution is

1. molar conductance
2. conductance
3. specific conductance
4. equivalent conductance

78. Both husband and wife have normal vision though their fathers were colorblind and mothers did not have any gene for colorblindness. The probability of their daughters becoming colorblind is

1. 50%
2. 75%
3. 0%

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4. 25%

79. 'Millennium Challenge Corporation (MCC)' is an initiative of which country ?

1. USA
2. Russia
3. China
4. Japan

80. Kaziranga National Park is located along which Indian River ?

1. Ganga
2. Yamuna
3. Brahmaputra
4. Sutlej

Model paper 3 key

Electrical Engineering

1.3, 2.2, 3.3, 4.2, 5.4, 6.1, 7.1, 8.1, 9.2, 10.2, 11.4, 12.4, 13.4, 14.3, 15.3, 16.3, 17.2, 18.3, 19.3, 20.4, 21.1, 22.1, 23.1, 24.2, 25.2, 26.1, 27.4, 28.3, 29.2, 30.4, 31.1, 32.4, 33.4, 34.4, 35.1, 36.3, 37.3, 38.3, 39.2, 40.1, 41.1, 42.3, 43.2, 44.3, 45.2, 46.1, 47.2, 48.1, 49.2, 50.1, 51.1, 52.2, 53.2, 54.2, 55.2, 56.4, 57.2, 58.2, 59.2, 60.4, 61.3, 62.2, 63.4, 64.2, 65.3

General Knowledge

66.3, 67.2, 68.2, 69.2, 70. 2, 71.2, 72.1, 73.4, 74.2, 75.4, 76.4, 77.4, 78.3, 79.1, 80. 3

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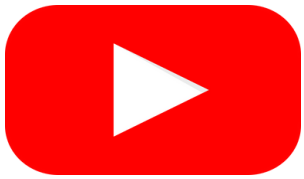

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