TS Southern Junior Lineman Exam
Model Paper 5

Electrical Engineering

1.In a two-channel oscilloscope operating in x-y mode, two in-phase 50 Hz sinusoidal waveforms of equal amplitude are fed to the two channels. What will be the resultant pattern on the screen?

1. An ellipse
2. A parabola
3. Straight line inclined at 45 with respect to x-axis
4. A circle

2. Materials, whose resistivity at very low temperature plunges from a finite value to zero and remains there upon further cooling, are known as

1. Ferromagnetic materials
2. High-energy hard magnetic materials
3. Superconductors
4. Ferromagnetic materials

3. In a superconductor, is the temperature is decreased below its critical temperature, the value of critical magnetic field will

1. Increase
2. Decrease
3. Not change
4. Increase or decrease depending on the superconductor material

4. The imaginary part of dielectric constant determines

1. Component of current which is in phase with the applied field
2. Component of energy absorbed per m^3
3. Amount of applied field
4. Component of voltage which is in phase with the applied field

5. Direction: Each of the items consists of two statements, one labeled as the 'Statement (I)' and the other as 'Statement (II)'. Examine these two statements carefully and select the answers to these items using the codes given below

Statement (I): Hard magnetic materials are used for making permanent magnets.
Statement (II):
Hard magnetic materials have relatively small and narrow hysteresis loop.

1. Both Statement (I) and Statement (II) are individually true and Statement (II) is the correct explanation of Statement (I)
2. Both Statement (I) and Statement (II) are individually true and Statement (II) is NOT the correct explanation of Statement (I)
3. Statement (I) is true but Statement (II) is false
4. Statement (I) is false but Statement (II) is true

6. In 8085A microprocessor, the operation performed by the instruction LHLD 2100 H is

1. (H) ← 21 H, (L) ←00
2. (H) ← M (2100 H), (L) ←M(2101H)
3. (H) ← M (2100 H), (L) ←M(2100H)
4. (H) ← 00H, (L) ←21H

7. The field strength at a point of finite distance from an infinitely long straight uniform charged conductor is obtained by considering the radial (R) component and the longitudinal (L) component of the forces acting on a unit charge at the point, by the charges on the elemental length of the conductor. The resultant field strength is

1. The sum of R-components, when the sum of L-components is zero
2. The sum of L-components, when the sum of R-components is zero
3. The sum of both R- and L- components
4. Average of the sums of R- and L- components

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8. A conductor having a cross-sectional area *a* sq m carrying current $I\vec{j}$ A, lies in a magnetic field $\vec{B} = B_0(\vec{i} + \vec{j})$ Wb/m^2 The force density on the conductor is Where $\vec{i}$, $\vec{j}$ and $\vec{k}$ are orthogonal unit vectors.

1. $\frac{B_0}{a} I\vec{k}$
2. $-\frac{B_0}{a} I\vec{i}$
3. $-\frac{B_0}{a} I\vec{k}$
4. $\frac{B_0}{a} I\vec{j}$

9. For electromechanical energy conversion, a magnetic field is employed as the medium rather than electric field because

1. The stored energy density for practicable field strength is low in the electric field
2. the electric field presents insulation problem
3. the specific magnetic loss is more than the specific dielectric loss
4. none of the above

10. if the current density inside a straight conductor is uniform over its cross-section, the flux density variation inside the conductor at different distances from its center is

1. linear
2. square of the distance
3. inverse of the distance
4. exponential

11. The law which states that the line integral of the magnetic field around a closed curve is equal to the free current through a surface, is

1. Gauss's law
2. Tellegen's theorem
3. Coulomb's law
4. Ampere's law

12. $(\nabla \times H) = J$ is differential form of

1. Gauss's law
2. Ampere's circuital law
3. Poisson's equation
4. Laplace's equation

13. A basic D'Arsonval movement showing full scale deflection for a current of 50 and having internal resistance of 500Ω is used as a voltmeter. What is the value of multiplier resistance needed to measure a voltage range of 0-20V?

1. 398.5 kΩ
2. 399 kΩ
3. 399.5 kΩ
4. 400 kΩ

14. One single-phase energy meter operating on 230 V and 5A for 5 hours makes 1940 revolutions. Meter constant is 400 rev/kWh. The power factor of the load is

1. 1.0
2. 0.8
3. 0.7
4. 0.6

15. In DeSauty Bridge (unmodified form) it is possible to obtain balance

1. Even if both the capacitors are imperfect.
2. If one of the capacitors is perfect
3. Only if both the capacitors are perfect
4. All of the above

16. The current coil of a single-phase energy meter is wound on

1. One limb of the laminated core
2. Both the limbs of the laminated core with same number of turns
3. Both the limbs of the laminated core with different number of turns

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4. The center of the limb on the laminated core

17. For controlling the vibration of the disc of ac energy meter , damping torque is produced by

1. Eddy current
2. Chemical effect
3. Electrostatic effect
4. Magnetic effect

18. The meter constant of a single-phase 230 V induction watt hour meter is 400 revolutions per kWh. The speed of the meter disc for a current of 10A of 0.9 pf lagging will be

1. 13.80 rpm
2. 16.02 rpm
3. 18.20 rpm
4. 21.10 rpm

19. A convertor type 8-bit A/D convertor is driven by a 500 kHz clock. What are the maximum counts, average conversion time and maximum conversion rate respectively?

1. 256 counts, 200 × 10^{-6} sec and 1000 conversions/sec
2. 256 counts, 200 × 10^{-6} sec and 1953 conversions/sec
3. 128 counts, 200 × 10^{-6} sec and 1200 conversions/sec
4. 128 counts, 200 × 10^{-6} sec and 1000 conversions/sec

20. The speed of conversion is maximum in

1. Successive approximation A/D convertor
2. Parallel comparator A/D convertor
3. Counter ramp A/D convertor
4. Dual slope A/D convertor

21. In an 8-bit D/A convertor, the reference voltage used is 10V. What voltage is represented by 1010 0001?

1. 0.00392 V
2. 6.314 V
3. 6.288 V
4. 5.814 V

22. A 4-bit modulo-6 ripple counter uses J-K flip-flops. If the propagation delay of each flip-flop is 50 ns, the maximum clock frequency that can be used is

1. 5 MHz
2. 6.95 MHz
3. 10 MHz
4. 20 MHz

23. The following switching functions are to be implemented using a Decoder:
$f_1 = \sum m (1, 2, 4, 8, 10, 14)$
$f_2 = \sum m (2, 5, 9, 11)$
$f_3 = \sum m (2, 4, 5, 6, 7)$
The minimum configuration of the decoder should be

1. 2-to-4 lines
2. 3-to-8 lines
3. 4-to-16 lines
4. 5-to-32 lines

24. A 4-bit D/A convertor gives an output voltage of 4.5V for an input code of 1001. The output voltage for an input code of 0110 is

1. 1.5 V
2. 2.0 V
3. 3.0 V
4. 4.5 V

25. If an input signal ranges from 20μA - 40μA with an output signal ranging from 0.5mA – 1.5mA, what is the β_{ac} ?

1. 0.05
2. 20
3. 50
4. 500

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26.The best device for improving the switching speeds of bipolar transistors is

1. Speed-up capacitor
2. Transistor with higher cut-off frequency
3. Clamping diode
4. Clamping diode with zero storage time

27. The early effect in bipolar junction transistor is caused by

1. Fast turn-off
2. Fast turn-on
3. Large emitter to base forward bias
4. Large collector to base reverse bias

28. To get higher cut-off frequency in a BJT, base sheet resistance should be

1. Low
2. High
3. Equal to cut-off frequency
4. Zero

29. A BJT operates as a switch

1. In the active region of transfer characteristics
2. With no signal condition
3. Under small signal conditions
4. Under large signal conditions

30. What is the biasing condition of junctions in bipolar junction transistor to work as an amplifier?

1. Reverse biased base to emitter junction and reverse biased base to collector junction
2. Forward biased base to emitter junction and reverse biased base to collector junction
3. Forward biased base to emitter junction and forward biased base to collector junction
4. Reverse biased base to emitter junction and forward biased base to collector junction

31. A Schottky diode is

1. A majority carrier device
2. A minority carrier device
3. A fast recovery diode
4. Both majority and minority carrier diode

32. An SCR has V_{DRM} = 600 V, $(\frac{dv}{dt})_{max}=25\frac{v}{\mu s}$, and $(\frac{di}{dt})_{max}=30\frac{A}{\mu s}$

It is used to energize a 100Ω resistance load. What are the minimum values for an RC snubber circuit to avoid unintentional triggering? (V_{DRM} means peak repetitive forward blocking voltage)

1. T = 10 **µs**, C = 2.4 **µF** and R = 4.5 m Ω
2. T = 24 **µs**, C = 0.24 **µF** and R = 4.5 m Ω
3. T = 24 **µs**, C = 2.4 **µF** and R = 7.0 m Ω
4. T = 10 **µs**, C = 0.24 **µF** and R = 7.0 m Ω

33. Maximum string efficiency is achieved when

1. Uniform distribution of voltage across SCRs in a string appears
2. Uneven distribution of voltage across SCRs in a string appears
3. One of the SCRs shares maximum voltage and rest share same volta
4. Derating factor = 1 – string efficiency

34. When a transistor is connected in common emitter mode it will have

1. Negligible input resistance and high output resistance
2. High input resistance and low output resistance
3. Medium input resistance and high output resistance
4. Low input resistance as well as output resistance

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35. The bandwidth of an RC-coupled amplifier is limited by

1. Coupling capacitors at the low frequency end and bypass capacitors at the high frequency end
2. Coupling capacitors at the high frequency end and bypass capacitors at the low frequency end
3. Bypass and coupling capacitors at the low frequency end and device shunt capacitors at the high frequency end
4. Device shunt capacitors at the low frequency end and bypass as well as coupling capacitors at the high frequency end

36. The increase in value of β of transistor can cause the fixed bias circuit to

1. Shift from saturation region to active region
2. Shift the operation from active mode to saturation mode
3. Shift the operation from saturation mode to cutoff mode
4. Shift the operation from cutoff mode to active mode

37. Which of the following Derichlets conditions are correct for convergence of Fourier transform of the function x(t)?

1. x(t) is square integrable
2. x(t) must be periodic
3. x(t) should have finite number of maxima and minima within any finite interval
4. x(t) should have finite number of discontinuities within any finite interval

38. If *f(t)* is a real and odd function, then its Fourier transform F(ω) will be

1. Real and even function of ω
2. Real and odd function of ω
3. imaginary and odd function of ω
4. imaginary function of ω

39. For certain sequences which are neither absolutely summable nore square summable, it is possible to have a Fourier transform (FT) representation if we

1. Take short time FT
2. Evaluate FT only the real part of the sequence
3. Allow DIFT to contain impulses
4. Evaluate FT over a limited time span

40.A unit Impulse function $\delta(t)$ is defined by
1. $\delta(t)$ =0 for all t except t=0
2. $\int_{-\infty}^{\infty} \delta(t) = 1$
The fourier transform F(ω) of $\delta(t)$ *is*

1. 1
2. $\frac{1}{\omega}$
3. 0
4. $\frac{1}{j\omega}$

41. The convolution x(n)* δ(n - n_0) is equal to

1. $x(n-n_0)$
2. $x(n+n_0)$
3. $x(n_0)$
4. $x(n)$

42. If the z-transform of x(n)is x(z)= $\frac{z(8z-7)}{4z^2-7z+3}$

Then the $\lim_{x\to\infty} x(n)$ is

1. 1
2. 2
3. ∞
4. 0

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43. What will be the gain margin in dB of a system having the following open loop transfer function?

$$G(s)H(s) = \frac{2}{s(s+1)}$$

1. None
2. 2
3. $\frac{1}{2}$
4. ∞

44. For a unit step input, a system with forward path transfer function $G(s) = \frac{20}{S^2}$ and feedback path transfer function $H(s) = (s+5)$ has a steady-state output of

1. 2
2. 0.5
3. 1
4. 0.2

45. By adding a pole at the origin of s-plane, the Nyquist plot of a system will rotate by

1. 90° in anti-clockwise direction
2. 90° in clockwise direction
3. 180° in anti-clockwise direction
4. 180° in clockwise direction

46. The characteristic equation of a feedback control system is $s^4+s^3+2s^2+4s+15=0$ The number of roots in the right half of the s-plane is

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

47. In a Bode plot of a unity feedback control system, the value of phase of $G(j\omega)$ at the gain cross-over frequency is -125°. The phase margin of the system is

1. -125°
2. -55°
3. 55°
4. 125°

48. The correct sequence of steps needed to improve system stability is

1. Insert derivation action, use negative feedback and Reduce gain
2. Reduce gain, use negative feedback and insert derivation action
3. Reduce gain, insert derivation action and use negative feedback
4. Use negative feedback, reduce gain and insert derivation action

49. A 100 MVA, 50 Hz turbo-generator operates at no load at 3000 rpm. A load of 25 MW is suddenly applied to the machine and the steam valve to the turbine commences to open after 0.6 seconds due to the governor time-lag. Assuming inertia constant H = 0.5 kW-s per kVA of the generator rating, the frequency to which the generated voltage drops before the steam-flow commences to meet the new load is

1. 49.0 Hz
2. 50.15 Hz
3. 49.24 Hz
4. 49.82 Hz

50. The internal characteristic of a dc generator is plotted between the

1. Armature current and voltage generated after armature reaction
2. Field current and voltage generated at no load
3. Field current and voltage generated on load

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4. Armature current and voltage generated at the output terminals

51. In a dc machine, for the same number of slots and same current in the armature conductor, which one of the following will induce higher emf?

1. Lap winding
2. Wave winding
3. Compensating winding
4. Pole winding

52. A single-phase two winding transformer is designed to operate at 400/200 V, 50 Hz. If the h.v. side is now energized from a 400 V,40 Hz source, the no-load l.v. side voltage would be

1. 300 V
2. 250 V
3. 200 V
4. 150 V

53. A 100 VA,120/12 V transformer is to be connected so as to form a step-up transformer. A primary voltage of 120 V is applied to the transformer. What is the secondary voltage of the transformer?

1. 1.2 V
2. 12 V
3. 120 V
4. 132 V

54. In a transformer, if the iron losses and copper losses are 40.5 kW and 50 kW respectively, then at what fraction of load will the efficiency be maximum?

1. 0.80
2. 0.57
3. 0.70
4. 0.90

55. The positive, Negative and zero sequence per unit impedances of two generators connected in parallel are $X_1 = 0.12$, $X_2 = 0.096$ and $X_0 = 0.036$ pu. For a L-G fault at generator terminals (with 1 pu voltage) the positive sequence current will be:

1. 7.936 pu
2. 11.936 pu
3. 10.936 pu
4. 8.936 pu

56. A 50 MVA, 11 kV, 3-phase generator has a stored energy of 400 MJ. Its inertia constant is:

1. 4
2. 8
3. 2
4. 16

57. The steady state stability limit of a synchronous machine connected to infinite bus is 2.2 pu. infinite bus voltage is 1 pu and synchronous machine voltage is 1.1 pu. The transfer reactance between generator and infinite bus is:

1. j 0.5
2. –j 0.5
3. j 1.0
4. –j 1.0

58. Two identical synchronous machines having same inertia constant are connected in parallel and swinging together. The effective inertia constant is 4 MJ/MVA. Then each machine has an inertia constant of:

1. 2 MJ/MVA
2. 4 MJ/MVA
3. 8 MJ/MVA
4. 16 MJ/MVA

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59. A large ac generator supplying power to an infinite bus is suddenly short-circuited at its terminals. Assuming the prime-mover input and the voltage behind the transient reactance to remain constant immediately after the fault, the acceleration of the generator rotor is:

1. Inversely proportional to the moment of inertia of the machine
2. Inversely proportional to the square of the voltage
3. Directly proportional to the square of the short-circuited current.
4. Directly proportional to the short-circuited power.

60. In an interconnected power system, the most suitable power plant to meet the peak load condition is

1. Hydel
2. Nuclear
3. Steam
4. Pumped storage

61. In a single-phase full bridge inverter what is the advantage of a unipolar switching over the bipolar switching?

1. Increase of the fundamental component by a factor of 1.15 for the same DC-input voltage
2. Elimination of 5^{th} and 7^{th} harmonics
3. Apparent doubling of the switching frequency
4. None of the above

62. It is required to control the speed and braking operation of a dc shunt motor in both the directions of rotation. The most suitable power electronic circuit will be

1. A half-controlled converter
2. A fully- controlled converter
3. A diode-bridge converter
4. A dual converter

63. Loading by the measuring instruments introduces an error in the measured parameter. Which of the following devices gives most accurate result?

1. PMMC
2. Hot-wire
3. CRO
4. Electrodynamic

64. A moving-coil galvanometer can be used as a DC ammeter by connecting

1. a high resistance in series with the meter
2. a high resistance across the meter
3. a low resistance across the meter
4. a low resistance in series with the meter

65. Consider the following types of damping:
1. Air-friction damping
2.Fluid-friction damping
3.Eddy-current damping
PMMC type instruments use which of the above?

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

General knowledge

66. The credit of discovering the sea route of India goes to the

1. French
2. Dutch
3. Portuguese
4. English

67. Which one among the following wars was ended by the Treaty of Madras

1. 1^{st} carnatic war
2. 2^{nd} carnatic war

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3. 1st Mysore war
4. 2nd Mysore war

68. During the period of the Renaissance new styles of architecture first developed in:

1. France
2. England
3. Italy
4. Germany

69. Which State has the largest coastline in India?

1. Gujarat
2. Tamil Nadu
3. Karnataka
4. Andhra Pradesh

70. When the wind is deflected due to the rotation of the Earth, it is called as:

1. Geostropic wind
2. polar wind
3. westerlies
4. trade winds

71. Which of the following programmes aims at the promotion of savings among rural women

1. Rashtriya Mahia Kosh
2. Indira MahilaYojna
3. Jawahar Rozgar Yojna
4. Mahila Samridhi Yojna

72. The Constitution (88thAmendment) Act is related to

1. empowering the canter levy and appropriate service tax
2. the Constitution of the National Judicial Commission
3. readjustment of electoral Constituencies on basis of the Population Census 2001
4. the demarcation of new boundaries between states

73. Which of the following district has the lowest HDI (Human Development Index) In Telangana State ?

1. Nalgonda
2. Mahaboobnagar
3. Adilabad
4. Khammam

74. Which district has the lowest population in Telangana State as per 2011 Census ?

1. Nizamabad
2. Khammam
3. Adilabad
4. Warangal

75. Density of population in Telangana as per 2011 Census

1. 227 persons per sq. Km.
2. 307 persons per sq. Km.
3. 325 persons per sq. Km.
4. 350 persons per sq. Km.

76. Three resistors 1 Ω, 2 Ω, 3Ω resistor a 3 V battery is connected. The current through 3 Ω resistor is

1. 0.75 A
2. 1 A
3. 2 A
4. 1.5 A

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77. A 6% solution of urea is isotonic with

1. 1 M solution of glucose
2. 0.05 M solution of glucose
3. 6% solution of glucose
4. 25% solution of glucose

78. Identify the group, which includes animals all of which give birth to young ones directly?

1. Dolphin, kangaroo, bat, cat
2. Platypus, penguin, bat, hippopotamus
3. shrew, bat, kiwi, car
4. Lion, whale, ostrich, bat

79. Name the operation launched by Indian Government for the evacuation of Indian National from Ukraine due to Russia -Ukraine war.

1. Operation Yamuna
2. Operation Ganga
3. Operation Rahat
4. Operation Insaniyat

80. The Lok Sabha passed a bill to merge three municipal corporations of which city into a single entity?

1. Mumbai
2. Delhi
3. Kolkata
4. Chennai

Model paper 5 key

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1.3, 2.3, 3.1, 4.2, 5.3, 6.3, 7.1, 8.3, 9.1, 10.1, 11.4, 12.2, 13.3, 14.2, 15.3, 16.2, 17.1, 18.1, 19.2, 20.2, 21.2, 22.1, 23.3, 24.3, 25.3, 26.4, 27.4, 28.1, 29.4, 30.2, 31.1, 32.2, 33.1, 34.3, 35.3, 36.2, 37.3, 38.3, 39.3, 40.1, 41.1, 42.1, 43.4, 44.4, 45.2, 46.2, 47.3, 48.4, 49.3, 50.1, 51.2, 52.3, 53.4, 54.4, 55.1, 56.2, 57.1, 58.1, 59.1, 60.4, 61.3, 62.4, 63.3, 64.3, 65.3

General knowledge

66.3, 67.3, 68.3, 69.1, 70.1, 71.4, 72.1, 73.2, 74.1, 75.2, 76.2, 77.1, 78.1 79.2, 80.2