TSGENCO AE

Previous Year Paper

(Electronics)
14 November 2015

Note: **(1)** Answer all questions.

(2) Each question carries 1 mark. There are no negative marks.

(3) Answer to the questions must be entered only on OMR Answer Sheet provided separately by Completely shading with **Ball Point Pen (Black) only.**

(4) The OMR Answer Sheet will be invalidated if the circle is shaded using Pencil or if more than one circle is shaded against each question.

Section A : Electronics Engineering

1. With the signal generator frequency of a Q meter set to 1.25 MHz, the Q of a coil is measured as 98 when Capacitance C = 147 pF. Then the coil inductance and resistance would be
   (1) 112 nH, 12 Ω
   (2) 982 nH, 10 Ω
   (3) 110 μH, 8.8 Ω
   (4) 320 μH, 6.2 Ω

2. A pulse waveform with a 3.3 kΩ source resistance is to be displayed on an oscilloscope with an input capacitance of 15 pF. The rise time of the pulse shown on the scope is measured as
   (1) 49.5 ns
   (2) 54.45 ns
   (3) 113.85 ns
   (4) 109.0 ns

3. Hay bridge is used to measure
   (1) very low resistances
   (2) inductance of a coil
   (3) capacitance of a capacitor
   (4) impedance of a circuit

4. VTVM stands for
   (1) Vacuum Tube Voltmeter
   (2) Valve type Variable Meter
   (3) Volt Temperature Virtual Meter
   (4) Virtual Type Voltmeter

5. Wavelength of the visible light extends from
   (1) 0.8 to 1.0 nm
   (2) 400 to 750 nm
   (3) 200 to 350 nm
   (4) 25 nm to 75 nm

6. Which one of the following light sensors produces largest output current?
   (1) PIN photodiode
   (2) Photovoltaic diode
   (3) Avalanche Photodiode
   (4) Zener diode

7. The type of lasers that use organic dyes enclosed in glass tube for an active medium is
   (1) plasma lasers   (2) liquid lasers
   (3) ruby lasers   (4) neon lasers

8. What is the duration of the bus-cycle in an 8086 based microcomputer, if the clock frequency is 12 MHz without any wait - states?
   (1) 83 ns   (2) 581 ns   (3) 332 ns   (4) 249 ns

9. How many interrupt request lines are available in programmable interrupt controller 8259A?
   (1) 8   (2) 6   (3) 4   (4) 16

10. In a DMA write operation the data is transferred
    (1) from I/O to memory   (2) from memory to I/O
    (3) from memory to memory   (4) from I/O to I/O

11. 8251 IC is a
    (1) UART   (2) USART
    (3) Programmable Interrupt controller   (4) Programmable interval timer/counter

12. How many bits are used as conditional flags in the flag register of 8086?
    (1) 16   (2) 12   (3) 11   (4) 6

13. How many hardware interrupts are there in 8086?
    (1) 12   (2) 6   (3) 2   (4) 8

14. Which one of the following ICs is a tri-state buffer?
    (1) 74LS121   (2) 74LS90
    (3) 74LS138   (4) 74LS244

15. How many bytes of bit addressable memory is present in 8051 based microcontrollers?
    (1) 8 bytes   (2) 32 bytes
    (3) 16 bytes   (4) 128 bytes

16. In Telecommunication Networks, the unit of traffic intensity is

    (1) Baud   (2) Erlang   (3) Power/Hz   (4) Users/Watt

17. The maximum access time that can be permitted for the data and control memories in Time Slot Interchange switch with a single input and single output trunk multiplexing 2500 channels is (Assume that one speech sample appearing every 125 µs on the line) _____

    (1) 25 µs   (2) 25 ns   (3) 5 ms   (4) 5 sec

18. A circuit switched connection involves 5 switching nodes. Each node takes 2 seconds and 0.2 second for establishing and releasing connections respectively. If the data transfer rate is 2400 bps, the data transfer time for a message of 300 bytes long is _____

    (1) 5.0 sec   (2) 0.2 sec   (3) 2.2 sec   (4) 10.0 sec

19. In common channel signaling SS7 frame format, the number of bits that are used in error checking field is _____

    (1) 8 bits   (2) 16 bits   (3) 32 bits   (4) 24 bits

20. In cellular mobile communications, the forward channel frequency band of AMPS system is _____

    (1) 824-849 MHz   (2) 800-900 Hz
    (3) 1750-1925 MHz   (4) 869-894 MHz

21. Nyquist stability criterion is used to determine

    (1) both open loop and closed loop stability
    (2) only open loop stability
    (3) neither open loop nor closed loop stability
    (4) only closed loop stability

22. The open loop transfer function of a system is $G(s)H(s) = 10 s (s+0.25 s)$. The frequency in rad/sec at which the Nyquist plot intersects with - ve real axis is

    (1) 2.5   (2) ∞ (3) 0   (4) 4

23. If the system has multiple poles on the '$j\omega$' axis, the system is

    (1) stable   (2) conditionally stable
    (3) marginally stable   (4) unstable

24. Sine wave can be converted into square wave using
    (1) monostable
    (2) schmitt trigger
    (3) clamping circuit
    (4) astable multivibrator

25. The rise time of low pass RC circuit is given by
    (1) 2.2 RC
    (2) 30.2 RC
    (3) 10 RC
    (4) 20.2 RC

26. In RC integrator circuit the output is taken across
    (1) resistor
    (2) transistor
    (3) diode
    (4) capacitor

27. The part which converts alternating voltage to a direct voltage in a DC machine is
    (1) commutator
    (2) armature
    (3) poles
    (4) brushes

28. Which of the following is not a static characteristic?
    (1) drift
    (2) dead zone
    (3) sensitivity
    (4) fidelity

29. Parameter defined as the nearness of the indicated value to the true value of the quantity being measured is
    (1) accuracy
    (2) resolution
    (3) reproducibility
    (4) static error

30. Deflection sensitivity of a CRO is expressed in terms of
    (1) V/cm
    (2) cm/V
    (3) V/cm^2
    (4) V.cm

31. A planar graph has total number of branches b = 7. Number of meshes = 4. The dual graph will have total number of nodes given by
    (1) 2
    (2) 3
    (3) 4
    (4) 5

32. Three equal resistance of 3 ohm are connected in star. What is the resistance of one arm in equivalent delta?
    (1) 1 ohm
    (2) 3 ohm
    (3) 9 ohm
    (4) 27 ohm

33. In a series RLC circuit, if C is increased what happens to resonant frequency?
    (1) It increases
    (2) It decreases
    (3) It remains same
    (4) It depends upon the value of R

34. Which meter has the highest accuracy in prescribed limit of frequency range?
    (1) PMMC
    (2) moving iron
    (3) electrodynamometer
    (4) rectifier

35. When the pointer of an indicating instrument comes to rest in the final deflected position
    (1) only controlling torque act
    (2) only deflecting torque act
    (3) both controlling and deflecting torque act
    (4) only damping torque act

36. The yoke of d.c. machine is made of
    (1) silicon steel
    (2) soft iron
    (3) aluminium
    (4) cast steel

37. If the field current of a dc shunt motor is changed, then
    (1) the torque remains constant but output power will change
    (2) the output power remains constant but torque will change
    (3) both the torque and output power will change
    (4) both the torque and output power will remain constant

38. The back e.m.f in a d.c. motor
    (1) oppose the applied voltage
    (2) aids the applied voltage
    (3) aids the armature current
    (4) oppose the armature current

39. The ripple factor of power supply is a measure of
    (1) its filter efficiency
    (2) diode rating
    (3) its voltage regulation
    (4) purity of DC power output

40. _____ is defined as the difference between the largest and smallest reading of instrument.
    (1) span
    (2) range
    (3) dead space
    (4) resolution

41. A circuit contains a dependent voltage source and two resistors. If Thevenin's equivalent is to be found across one of the resistors, the resulting Thevenin's equivalent has

    (1) a voltage source and a resistor only

    (2) a current source and a resistor only

    (3) a resistor only

    (4) either voltage source or current source only

42. The transformation of Y_{22}/Δ y into one of the z-parameters is

    (1) z_{11} (2) z_{12} (3) z_{21} (4) z_{22}

43. In an RLC network when all are connected in parallel, the driving point impedance of the network is given by $Z(s) = \dfrac{0.2s}{[s^2 + 0.1s + 2]}$. The component values are

    (1) L = 5 H, R = 0.5 Ω, C = 0.1 F   (2) L = 0.1 H, R = 0.5 Ω, C = 5 F

    (3) L = 5 H, R = 2 Ω, C = 0.1 F   (4) L = 0.1 H, R = 2 Ω, C = 5 F

44. The maximum percentage error in the sum of two voltage measurements when V_1 = 100 V ± 1% and V_2 = 80 V ± 5% is

    (1) 180 V ± 6.0%   (2) 180 V ± 4.0%

    (3) 180 V ± 2.8%   (4) 180 V ± 3.6%

45. A resistance strain gauge with a gauge factor of 2 is cemented to a steel member, which is subjected to a strain of 10^{-6}. If the original resistance value of the gauge is 130 Ω, the change in the resistance would be _____

    (1) 135 μΩ   (2) 260 μΩ

    (3) 120 μΩ   (4) 320 μΩ

46. Which one of the following materials does not produce an emf, when they are placed under stress?

    (1) Quartz   (2) Rochelle salt

    (3) Barium titanate   (4) Aluminum

47. In the measurement of pH value, 10^{-11} moles of hydrogen ions in 1 liter of liquid equals to
    (1) 11 pH   (2) 8 pH   (3) 2 pH   (4) 3 pH

48. Thermocouple made of _____ conductors has lowest temperature sensing range
    (1) Nickel Chromium / Constantan   (2) Iron / Constantan
    (3) Copper / Constantan   (4) Nicrosil / Nisil

49. A full wave rectifier with a centre-tapped transformer supplies dc current of 100 mA to a load resistance of 20 Ω. The secondary resistance of transformer is 1 Ω. Each diode has a forward resistance of 0.5 Ω. What are rms values of signal voltage across each half of the secondary as well as dc power supplied to the load?
    (1) 2.39 V and 0.2 Watts   (2) 23.9 V and 2 Watts
    (3) 0.239 V and 20 Watts   (4) 2.39 V and 2 Watts

50. Unit of thermal resistance that is used in the design of heat sinks (for power amplifiers) is
    (1) Ohms   (2) °C   (3) °C / Ohms   (4) °C / Watt

51. If the emitter diffusion capacitance and transconductance of a transistor at high frequencies are 100 pF and 50 mA/V respectively, then the frequency at which the short-circuit common emitter current gain attains unit magnitude is
    (1) 1.25 MHz   (2) 79.57 MHz
    (3) 55.28 MHz   (4) 7.23 MHz

52. A JFET has got the following specifications: $V_{GS(OFF)} = -2V$, $I_{DSS} = 4$ mA. When the applied V_{GS} is one fourth of the $V_{GS(OFF)}$, to the JFET, then the drain current of the device would be
    (1) 2.25 mA   (2) 4 mA   (3) 0.25 mA   (4) 1.0 mA

53. A voltage divider bias circuit uses n channel JFET as its active device with $V_{DD} = 25$ V. To have minimum $V_{DS} = 10$ V & $I_{Dmax} = 3$ mA, the value of the drain resistance will be (if $R_S = 2.25$ kΩ)
    (1) 1.2 kΩ   (2) 3.9 kΩ   (3) 2.75 kΩ   (4) 270 Ω

54. In RC-phase shift oscillator circuit using BJT _____ feedback is employed.
    (1) voltage series   (2) voltage shunt
    (3) current series   (4) current shunt

55. The output voltage of circuit shown below is
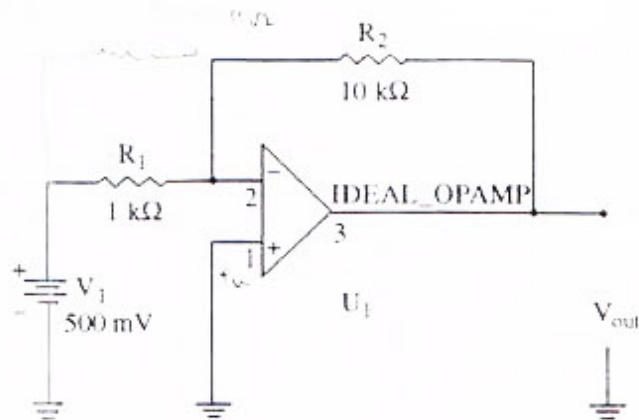
(1) −10 V (2) 5 V (3) −5 V (4) 0.5 V

56. To design a fourth-order Butterworth low-pass filter with a cutoff frequency of 1 kHz using OP-AMP. we need to cascade two second order prototypes. Then the voltage gains of the two second order systems would be (respectively):

(1) 2.235, 1.152 (2) 1.0, 1.586

(3) 1.586, 1.586 (4) 1.0, 1.0

57. The Boolean expression $x'y + xy' + xy$ is equivalent to

(1) $(x+y)'$ (2) $x'y$ (3) $x+y$ (4) xy

58. If the input to T-flip-flop is 100 Hz signal. the final output of the three T-flip-flops that are connected in cascade is

(1) 1000 Hz (2) 500 Hz (3) 333 Hz (4) 12.5 Hz

59. Which of following consume minimum power?

(1) TTL (2) CMOS (3) DTL (4) RTL

60. The output Y of a 2-bit comparator is logic 1 whenever the 2-bit input A is greater than the 2-bit input B. The number of combinations for which the output is logic 1. is

(1) 4 (2) 6 (3) 8 (4) 10

61. In a collector coupled monostable multivibrator circuit using BJTs, the period of quasi-stable state of the circuit in terms of its R-C values is
    (1) 2.3 RC   (2) 2.2 RC   (3) 1.38 RC   (4) 0.69 RC

62. In a D/A converter made with binary weighted resistors, it is difficult to maintain high accuracy as the number of bits increases, because
    (1) as the resistance values of the most significant bits becomes larger, the circuit takes long time to settle
    (2) obtaining stable and precise resistors with a large spread in their values is very difficult
    (3) the LSB resistance consume too much of current and power
    (4) the finite gain of the OP-AMP increases inaccuracies

63. The differential gain of op-amp is 4000 and value of CMRR is 150. Its output voltage, when the two input voltages are 200 μV and 160 μV respectively, will be
    (1) 16 V   (2) 76 mV   (3) 64 mV   (4) 164.8 mV

64. Two systems with impulse responses $h_1(t)$ and $h_2(t)$ are connected in cascade. Then the overall impulse response of the cascaded system is given by
    (1) product of $h_1(t)$ and $h_2(t)$ (2) sum of $h_1(t)$ and $h_2(t)$
    (3) convolution of $h_1(t)$ and $h_2(t)$ (4) subtraction of $h_1(t)$ and $h_2(t)$

65. The Fourier transform of rectangular pulse of width 'τ' sec and having unit magnitude is
    (1) $\tau \, sinc \, (\omega\tau)$ (2) $\tau \, sinc \, (\pi f\tau)$
    (3) $sinc \, (\omega\tau)$ (4) $sinc \, (\pi f\tau)$

66. The maximum and minimum values of autocorrelation function of a binary signal 1, 1, 1, –1, –1, 1, –1 are:
    (1) 14, 7   (2) 7, –1   (3) 14, –2   (4) 7, 1

67. The z-transform of a sequence $u[n] – u[n–2]$ is
    (1) $1+z$ (2) $1–z^{-1}$ (3) $z/(z-1)$ (4) $1 + z^{-1}$

68. In Amplitude Modulation, _____ of total transmitted power is used for carrying message signal under best conditions.
    (1) 25%   (2) 33%   (3) 50%   (4) 78%

69. A speech signal with maximum amplitude of $\pm 1V$ and bandwidth of 4 kHz is used as modulating signal in frequency modulation system. If the frequency sensitivity factor $k_f = 64000\,\pi$, then the modulation-index β of the frequency modulated signal is

   (1) 12.5   (2) 10.6   (3) 9.0   (4) 8.0

70. Which modulation scheme uses Hilbert transformer?

   (1) DSB   (2) PM   (3) VSB   (4) SSB

71. The frequency range used for FM broadcasting is

   (1) 78–87 MHz   (2) 0.550–1.65 MHz
   (3) 88–108 MHz   (4) 12–38 MHz

72. A PCM system uses Nyquist sampler, a uniform quantizer followed by a 5 bit binary encoder. The bit rate is 50 Mbps. The maximum message bandwidth for which the system operates satisfactorily is

   (1) 5 kHz   (2) 5 MHz   (3) 10 kHz   (4) 10 MHz

73. Two signals s(t) and r(t) are to be transmitted over a common channel by means of time-division multiplexing. The highest frequency of s(t) is 1 kHz, and that of r(t) is 1.5 kHz. The minimum value of the permissible sampling rate is

   (1) 3 kHz   (2) 2.5 kHz
   (3) 2 kHz   (4) 5 kHz

74. A stable Linear Time Invariant (LTI) system has a transfer function $H(s) = \dfrac{1}{s^2 + s - 6}$. To make this system causal it needs to be cascaded with another LTI system having a transfer function $H_1(s)$. A correct choice for $H_1(s)$ among the following options is

   (1) s+3   (2) s–2   (3) s–6   (4) s+1

75. In a Bode magnitude plot, which one of the following slopes would be exhibited at high frequencies by a 4th order all-pole system?

   (1) –80 dB/decade   (2) –40 dB/decade
   (3) +40 dB/decade   (4) +80 dB/decade

76. For the second order closed-loop system shown in the figure, the natural frequency (in rad/s) is
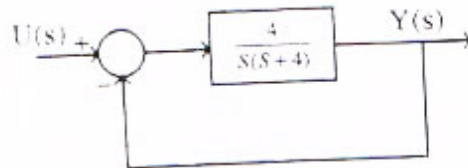
(1) 16 (2) 4 (3) 2 (4) 1

77. The most common two-phase ac servomotor differs from the standard ac induction motor because it has
   (1) higher rotor resistance
   (2) higher power rating
   (3) motor stator windings
   (4) greater inertia

78. A stepper motor having a resolution of 300 steps/rev and running at 2400 rpm has a pulse rate of _____ pps.
   (1) 4000 (2) 8000 (3) 6000 (4) 10000

79. An integral controller has a value of $K_I = 0.1$/sec. What will be the output after $t = 1$ sec. if there is a sudden change to a constant error of 20%?
   (1) 4% (2) 2% (3) 8% (4) 20%

80. Given the system transfer function $G(s) = \dfrac{Ke^{-0.2s}}{s(s+2)(s+8)}$, the corner frequencies in rad/s are
   (1) 0.2, 0.6 (2) 1, 4 (3) 3, 7 (4) 2, 8

P.T.O.

Section B : General Awareness and Numerical Ability

81. Martin Winterkorn, CEO of _____ automobiles resigned?
    (1) Skoda   (2) Ford   (3) FIAT   (4) Volkswagen

82. Identify the first sovereign ruler of Kakatiya dynasty.
    (1) Rudradeva   (2) Rudramadevi   (3) Ganapathi deva (4) Mahadeva

83. Which Mughal emperor conquered the Golconda kingdom on 1687 A.D.
    (1) Babur   (2) Akbar   (3) Shahjahan   (4) Aurangazeb

84. G.O. Number 610 is issued during the Chief Ministership of
    (1) N. Sanjeeva Reddy   (2) P.V. Narsimha Rao
    (3) T. Anjaiah   (4) N.T. Rama Rao

85. Who created the Emblem of Telangana state.
    (1) Ale Laxman   (2) Andesree   (3) Venkanna   (4) Gaddar

86. If $\sqrt{3} = 1.732$, then the value of $\frac{\sqrt{3}}{2} - \frac{7}{\sqrt{3}} + \sqrt{27}$ is equal to

    (1) 4.330   (2) 2.009   (3) 1.224   (4) 3.585

87. The difference between a two-digit number and the number obtained by interchanging the digits is 54. What is the difference between the sum and the difference of the digits of the number if the ratio between the digits of the number is 1:3?
    (1) 3   (2) 4   (3) 5   (4) 6

88. When a producer allows 34% commission on the retail price of this product, he earns a profit of 10%. What would be his profit percent if the commission is reduced by 12%?
    (1) 25   (2) 30   (3) 35   (4) 40

89. If 20 pumps can raise 5500 gallons of water in 12 days, working 6 hrs a day; in how many days will 12 pumps raise 2200 gallons of water, working 12 hrs a day?
    (1) 4   (2) 5   (3) 6   (4) 7

90. Through which device the main components of the computer communicate with each other?
    (1) System Bus   (2) Keyboard   (3) Monitor   (4) Memory

91. Which of the following memory is non-volatile?
    (1) SRAM   (2) DRAM   (3) ROM   (4) All the above

92. Microsoft Word is an example of
   (1) An Operating System
   (2) Application Software
   (3) Processing Device
   (4) System Software

93. Operating system is most common type of _____ Software.
   (1) Application
   (2) Communication
   (3) System
   (4) Word processing type

94. One compound expression is incorrect. Which one?
   (1) Court Martial
   (2) Chairman Deputy
   (3) Poet Laureate
   (4) Secretary General

95. Find correct sequence of sentences:
   Pollution has been defined
   a) or form of energy to the environment at
   b) accommodate its dispersion, breakdown, recycling or storage in some harmless form
   c) a rate faster than the environment can
   d) as the addition of any substance
   (1) acdb
   (2) dacb
   (3) dcab
   (4) cadb

96. Why do you always _____ me when I try to ask a question?
   (1) interpose
   (2) intercede
   (3) interfere
   (4) interrupt

97. There are several _____ that describe the state of being asleep.
   (1) impressions
   (2) expressions
   (3) conditions
   (4) digressions

98. _____ has been appointed as President of Cricket Association of Bengal?
   (1) Anil Kumble
   (2) Sachin Tendulkar
   (3) Ajay Jadeja
   (4) Sourav Ganguly

99. _____ (known as Metro Man) has been appointed to United Nations High Level Advisory Group on Sustainable Transport by UN Secretary General Ban Ki-moon for three years?
   (1) Upendra Tripathy
   (2) Sunil Arora
   (3) Sanjay Singh
   (4) Elattuvalapil Sreedharan

100. _____ is the Engineer's Day in India. It marks Birthday of Bharat Ratna Mokshagundam Visvesvarayya?
   (1) September 20
   (2) January 17
   (3) October 21
   (4) September 15