

DO NOT OPEN THIS TEST BOOKLET UNTIL YOU ARE ASKED TO DO SO**TEST BOOKLET SERIES****TEST BOOKLET
LECT (EEE) T.E. 2016**

Time Allowed : 2 Hours]

[Maximum Marks : 100

*All questions carry equal marks.***INSTRUCTIONS**

1. Immediately after the commencement of the examination, you should check that test booklet does not have any unprinted or torn or missing pages or items, etc. If so, get it replaced by a complete test booklet.
2. **Encode clearly the test booklet series A, B, C or D as the case may be in the appropriate place in the answer sheet.**
3. Write your Roll Number only in the box provided alongside.
Do not write anything else on the Test Booklet.
4. This Test Booklet contains 100 items (questions). Each item comprises four responses (answers). Choose only one response for each item which you consider the best.
5. After the candidate has read each item in the Test Booklet and decided which of the given responses is correct or the best, he has to mark the circle containing the letter of the selected response by blackening it completely with Black or Blue ball pen. In the following example, response "C" is so marked :

(A) (B) ● (D)
6. Do the encoding carefully as given in the illustrations. While encoding your particulars or marking the answers on answer sheet, you should blacken the circle corresponding to the choice in full and no part of the circle should be left unfilled. After the response has been marked in the ANSWER SHEET, to erasing/fluid is allowed.
7. You have to mark all your responses ONLY on the ANSWER SHEET separately given according to 'INSTRUCTIONS FOR CANDIDATES' already supplied to you. Responses marked on the Test Booklet or in any paper other than the answer sheet shall not be examined.
8. All items carry equal marks. Attempt all items. Your total marks will depend only on the number of correct responses marked by you in the Answer Sheet. There will be no negative marking.
9. Before you proceed to mark responses in the Answer Sheet fill in the particulars in the front portion of the Answer Sheet as per the instructions sent to you.
10. If a candidate give more than one answer, it will be treated as a wrong answer even if one of the given answers happens to be correct.
11. After you have completed the test, hand over the Answer Sheet only, to the Invigilator.

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1. A network has 10 nodes and 17 branches. The number of different node pair voltages would be :
(A) 7 (B) 9
(C) 10 (D) 45
2. The cut-set schedule gives the relation between :
(A) branch currents and link currents
(B) branch voltages and tree branch voltages
(C) branch voltages and link voltage
(D) branch currents and tree currents
3. Millman's theorem yields equivalent :
(A) impedance (B) current source
(C) voltage source (D) current or voltage source
4. A two-port network is defined by the relations :
 $I_1 = 2V_1 + V_2$ and $I_2 = V_1 + V_2$. Then z_{22} (in Ohms) is :
(A) 2 (B) 1
(C) -1 (D) -2

5. Two two-port networks a and b having A, B, C, D parameters as :

$$A_a = D_a = 4 \quad \text{and} \quad A_b = D_b = 3$$

$$B_a = 5, C_a = 3 \quad B_b = 4, C_b = 2$$

are connected in cascade in the order of a, b. The equivalent A parameter of the combination is :

(A) 17

(B) 22

(C) 24

(D) 31

6. In a band pass filter, the resonant frequency of shunt branch is that of series branch.

(A) greater than

(B) smaller than

(C) equal to

(D) any of these

7. Divergence theorem relates and integrals.

(A) volume, surface

(B) volume, line

(C) line, surface

(D) all of these

8. According to Maxwell's curl equation for electric field,

(A) $\nabla \cdot \mathbf{E} = 0$

(B) $\nabla \times \mathbf{E} = 0$

(C) $\nabla \cdot \mathbf{E} = \frac{\rho_v}{\epsilon}$

(D) $\nabla \cdot \mathbf{E} = \rho_v$

9. Match List-I with List-II and select the *correct* answer using the codes given below :

List-I (Expression)

List-II (Law/Theorem/Equation)

(a) $\nabla^2 V = -\frac{\rho_v}{\epsilon}$

(1) Gauss's law

(b) $\nabla^2 V = 0$

(2) Divergence theorem

(c) $\oiint \mathbf{D} \cdot d\mathbf{s} = Q$

(3) Laplace's equation

(d) $\iiint (\nabla \cdot \mathbf{D}) dv = \oiint \mathbf{D} \cdot d\mathbf{s}$

(4) Poisson's equation

Codes :

	(a)	(b)	(c)	(d)
(A)	(4)	(2)	(3)	(1)
(B)	(3)	(1)	(2)	(4)
(C)	(2)	(3)	(4)	(1)
(D)	(4)	(3)	(1)	(2)

10. If both the mediums are dielectrics, then boundary condition is given as

(A) $D_{1n} + D_{2n} = 0$

(B) $D_{1n} - D_{2n} = 0$

(C) $D_{1n} \cdot D_{2n} = 0$

(D) None of these

11. The mean free path of an electron is given by :

(A) the sum of average velocity and average time of collisions

(B) the difference of average velocity and average time of collisions

(C) the product of average velocity and average time of collisions

(D) the ratio of average velocity and average time of collisions

12. Above the ferromagnetic Curie temperature, the behaviour of a ferromagnetic material is somewhat similar to that of a/an material.

(A) Diamagnetic

(B) Paramagnetic

(C) Ferrimagnetic

(D) Anti-ferromagnetic

13. In the case of a distortionless transmission line
- (A) $\frac{R}{L} = \frac{G}{C}$ (B) $\alpha = \sqrt{RG}$ and $\beta = \omega\sqrt{LC}$
- (C) $z_0 = \sqrt{\frac{R}{G}} = \sqrt{\frac{L}{C}}$ (D) All of these
14. A quarter wave loss-less line reflects the load impedance to the input terminals as :
- (A) its inverse multiplied by the square of the characteristic resistance
- (B) the input impedance
- (C) the impedance of the inductor
- (D) the impedance of the capacitor
15. For the electromagnetic wave propagating in a good conductor, the magnetic field with respect to electric field by in time phase.
- (A) leads, 45° (B) lags, 45°
- (C) leads, 90° (D) lags, 90°

16. Which of the following tests needs two machines ?
- (A) Brake (B) Swinburne's
(C) Hopkinson's (D) Retardation
17. An amplidyne is provided with split poles so as to :
- (A) increase amplification factor (B) provide space for interpoles
(C) increase efficiency (D) dampout mechanical oscillations
18. In a dc motor, the shaft torque is less than armature torque. This is due to :
- (A) eddy current loss (B) hysteresis loss
(C) stray loss (D) all of these
19. The ratio of the starting torque to full load torque is minimum in case of :
- (A) cumulative compound motors (B) differential compound motors
(C) series motors (D) shunt motors

20. Open-circuit test in a transformer is performed with :
- (A) rated transformer voltage (B) rated transformer current
- (C) direct current (D) high frequency supply
21. Distribution transformers are designed to have maximum efficiency nearly at of full load.
- (A) 100% (B) 70%
- (C) 25% (D) 10%
22. Natural air cooling is used for transformers of rating upto :
- (A) 100 kVA (B) 500 kVA
- (C) 5-10 kVA (D) 10 MVA
23. The 5th space harmonics in the mmf developed by balanced fundamental frequency armature currents rotate at times the synchronous speed with respect to the field.
- (A) $5/6$ (B) $6/5$
- (C) $5/4$ (D) $5/7$

24. The rating of a synchronous machine is usually governed by its :
- (A) temperature rise (B) speed
(C) weight (D) mmf
25. An alternator with higher value of SCR has :
- (A) poor voltage regulation and lower stability limit
(B) poor voltage regulation and higher stability limit
(C) better voltage regulation and lower stability limit
(D) better voltage regulation and higher stability limit
26. A synchronous motor with negligible armature resistance runs at a load angle of 20° at the rated frequency. If supply frequency is increased by 10%, keeping other parameters constant, the new load angle will be :
- (A) 16° (B) 18°
(C) 20° (D) 22°

27. In an induction motor under running condition, the rotor reactance per phase is its standstill phase reactance.
- (A) s times (B) equal to
(C) $1/s$ times (D) $(1 - s)$ times
28. Which one of the following is the poorest electrical conductor ?
- (A) Steel (B) Aluminium
(C) Copper (D) Carbon
29. Which one of the following metals has the lowest temperature coefficient of resistance ?
- (A) Gold (B) Copper
(C) Aluminium (D) Kanthal
30. Which one of the following materials is *not* a piezoelectric material ?
- (A) BaTiO_3 (B) Quartz
(C) Rochelle salt (D) Yttrium garnet

31. In Francis turbine, the number of blades is usually of the order of :
- (A) 3-6 (B) 6-8
(C) 8-10 (D) 16-24
32. The maximum head of a Kaplan turbine is limited to :
- (A) 5 m (B) 25 m
(C) 70 m (D) 125 m
33. Flyash generally results from :
- (A) fluidized bed boilers (B) pulverized coal boilers
(C) diesel engines (D) gas turbines
34. Critical mass of the fuel is the amount required to make the multiplication factor :
- (A) less than unity (B) more than unity
(C) equal to unity (D) 0.5

35. If the generating station is situated very close to the load centre, the penalty factor for this unit will be :
- (A) zero (B) almost unity
(C) negative (D) very high
36. The voltage of a bus can be controlled by controlling the :
- (A) phase angle (B) reactive power of the bus
(C) active power of the bus (D) both (A) and (B)
37. The area under the load curve represents :
- (A) system voltage (B) current
(C) energy consumed (D) maximum demand
38. Domestic consumers are usually charged :
- (A) block rate tariff (B) flat rate tariff
(C) flat demand tariff (D) off peak tariff

39. The penalty for low power factor is imposed on consumers.
- (A) industrial (B) agricultural
(C) residential (D) commercial
40. The effect of wind pressure is more predominant on :
- (A) insulators (B) transmission lines
(C) supporting towers (D) none of these
41. Whenever the conductors are dead-ended or there is a change in the direction of transmission line, the insulators used are of the :
- (A) Pin type (B) Suspension type
(C) Shackle type (D) Strain type
42. Two insulator discs of identical capacitance value C makes up a string for a 22 kV, 50 Hz, single-phase overhead line insulation system. If the pin to earth capacitance is also C , then the string efficiency is :
- (A) 50% (B) 75%
(C) 86% (D) 90%

43. The only advantage of corona is that it :
- (A) produces a pleasing luminous glow
 - (B) makes line current sinusoidal
 - (C) works as a safety valve for surges
 - (D) ozone gas is produced
44. Characteristic impedance of an overhead transmission line is in the range of :
- (A) 100-200 Ohms
 - (B) 200-300 Ohms
 - (C) 0-100 Ohms
 - (D) 400-500 Ohms
45. For a fixed receiving end and sending end voltages in a transmission system, what is the locus of the constant power ?
- (A) A straight line
 - (B) An ellipse
 - (C) A parabola
 - (D) A circle

49. The neutral of 10 MVA, 11 kV alternator is earthed through a resistance of 50 Ohms. The earth fault relay is set to operate at 0.75 A. The CTs have a ratio of 1000/5. What percentage of the alternator winding is protected ?
- (A) 85% (B) 88.2%
- (C) 15% (D) 11%
50. Time graded protection of a radial feeder can be achieved by using :
- (A) definite time relays
- (B) inverse time relays
- (C) both definite and inverse time relays
- (D) none of the above
51. The $\frac{dv}{dt}$ effect in SCR can result in :
- (A) low capacitive charging current
- (B) false triggering
- (C) increased junction capacitance
- (D) high rate of rise of anode voltage

52. The average on state current for a thyristor is 20 A for a conduction angle of 120° . Its average on state current for 60° conduction angle would be :

(A) 20 A

(B) less than 20 A

(C) 40 A

(D) 60 A

53. In the buck-boost converter, what is the maximum value of the switch utilization factor ?

(A) 0.25

(B) 0.5

(C) 0.75

(D) 1.00

54. A step up chopper has source voltage and duty cycle of V and α . The output voltage of this chopper is :

(A) $\frac{V}{1-\alpha}$

(B) $V(1-\alpha)$

(C) $\frac{V}{1+\alpha}$

(D) $V(1+\alpha)$

55. How many switches are used to construct a three-phase to three-phase cycloconverters ?

(A) 3

(B) 6

(C) 12

(D) 18

56. In a CSI, if frequency of voltage is f , then frequency of output voltage is :

(A) f

(B) $\frac{f}{2}$

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

(D) $\frac{f}{8}$

57. The NAND-NAND realization is equivalent to realization.

(A) AND-NOT

(B) AND-OR

(C) OR-AND

(D) NOT-OR

58. When two 16-input multiplexers drive a 2-input MUX, what is the result ?

(A) 2-input MUX

(B) 4-input MUX

(C) 16-input MUX

(D) 32-input MUX

59. If a mod-6 counter is constructed using 3 flip-flops, the counter will skip :
- (A) 4 counts (B) 3 counts
(C) 2 counts (D) none of these counts
60. A single channel digital storage oscilloscope uses a 12 bit, 10^8 samples/s ADC. For a 10 kHz sine wave input, what is the number of samples taken per cycle of input ?
- (A) 10^{12} (B) 10^8
(C) 10^4 (D) 10^2
61. The smallest change in a measured variable to which an instrument will respond is :
- (A) accuracy (B) resolution
(C) precision (D) sensitivity

62. To reduce the effect of noise level, 100 sets of data are averaged. The averaged data set will have a noise level reduced by a factor of :
- (A) 10 (B) 14.14
(C) 70.7 (D) 100
63. To measure currents in MHz range, type of instrument is used.
- (A) moving iron (B) thermocouple
(C) electro-dynamometer (D) rectifier
64. An RLC series circuit is underdamped. To make it overdamped, the value of R :
- (A) has to be decreased (B) has to be decreased to zero
(C) has to be increased (D) has to be increased to infinity
65. What is clamp-on meter used for ?
- (A) Low ac current (B) High ac current
(C) Low dc current (D) High dc current

66. In measurement of resistance by Carey Foster bridge, no error is introduced due to :
- (A) contact resistance (B) connecting leads
- (C) thermoelectric emfs (D) all of these
67. Which one of the following measuring devices has minimum loading effect on the quantity under measurement ?
- (A) PMMC (B) Hot wire
- (C) Electrodynamicometer (D) CRO
68. One cycle of a square wave signal observed on an oscilloscope is found to occupy 6 cm at a scale setting of 30 $\mu\text{s}/\text{cm}$. What is the signal frequency ?
- (A) 55.5 kHz (B) 18 kHz
- (C) 5.55 kHz (D) 1.8 kHz

69. Integrating principle in the digital measurement is the conversion of :

(A) voltage to time

(B) voltage to frequency

(C) voltage to current

(D) current to voltage

70. What is a differential transformer ?

(A) constant pressure transducer

(B) variable pressure transducer

(C) constant displacement transducer

(D) variable inductance transducer

71. The steady-state error coefficients for a system are $k_p = \infty$, $k_v = 0$ finite constant $k_a = 0$. What is the type of system ?

(A) 8

(B) 2

(C) 1

(D) 0

72. For the equation $s^3 - 4s^2 + s + 6 = 0$, the number of roots in the left half of s-plane will be :

(A) 3

(B) 2

(C) 1

(D) 0

73. Which one of the following open-loop transfer functions has root locus parallel to imaginary axis ?

(A) $\frac{K}{(s+1)}$

(B) $\frac{K(s+1)}{(s+2)}$

(C) $K/(s+2)^2$

(D) $\frac{K(s+2)}{(s+1)^2}$

74. What is the gain margin of a system when the magnitude of the polar plot at phase crossover is 'a' ?

(A) $\frac{1}{a}$

(B) $-a$

(C) a

(D) zero

75. When 8 adjacent 1's grouped horizontally or vertically the group so formed is called :

(A) hex

(B) octet

(C) quad

(D) pair

76. The maximum possible number of states in a ripple counter with 5 flip-flops is :

(A) 32

(B) 15

(C) 10

(D) 5

77. The noise figure of an amplifier is 6 dB. If the input $\frac{S}{N}$ ratio is 38 dB, then the output $\frac{S}{N}$ ratio will be :

(A) 44 dB

(B) 40 dB

(C) 36 dB

(D) 32 dB

82. Near which town of Kangra District is Masroor temple ?
- (A) Nurpur (B) Palampur
(C) Haripur (D) Chandpur
83. According to the 2011 census which District of H.P. has the highest sex ratio ?
- (A) Kangra (B) Mandi
(C) Hamirpur (D) Bilaspur
84. Which raja of Bilaspur princely state sent invitation to Gurukha commander, Amar Singh Thapa, to invade Kangra ?
- (A) Devi Chand (B) Mahan Chand
(C) Kharak Chand (D) Jagat Chand
85. In which year did the activists of the Praja Mandal Movement march towards Dhami which culminated in the death of two Satyagrahis ?
- (A) 1939 (B) 1941
(C) 1942 (D) 1945

86. In which District of H.P. is a Dal lake ?
- (A) Sirmaur (B) Kangra
(C) Kullu (D) Shimla
87. Where do the people of Mandi region of H.P. go for holy dip on the Baishakhi Day ?
- (A) Tarna Devi (B) Riwalsar
(C) Drang (D) Bhangrotu
88. At which place in Kotkhai is the HPMC upgrading its packing house ?
- (A) Purag (B) Kiari
(C) Darkoti (D) Gumma
89. How many Panchayats have been selected for Swan River Integrated Watershed Management Project in Una District of H.P. ?
- (A) Fifteen (B) Seventeen
(C) Twenty (D) Twenty two

90. In which river basin is Sal Hydel Project ?
- (A) Ravi (B) Beas
(C) Satluj (D) Giri
91. With which of the following is Yamini Krishnamurthi associated ?
- (A) Civil service (B) Classical dance
(C) Cinema (D) Spiritualism
92. Which constitutional amendment of Indian Constitution dealing with National Judicial Appointments Commission was rejected by the Supreme Court of India ?
- (A) 92nd (B) 97th
(C) 99th (D) 102nd
93. With which sport is Deepika Kumari associated ?
- (A) Hockey (B) Archery
(C) Shooting (D) Table Tennis

94. What is India's rank in the 2015 Human Development Report ?
- (A) 120 (B) 125
(C) 130 (D) 138
95. Who was appointed Lokayukta of U.P. by the Supreme Court of India in 2015 ?
- (A) Justice R.M. Lodha
(B) Justice Virendra Kumar
(C) Justice Kurian Joseph
(D) None of the above
96. Who is the Chancellor of Germany ?
- (A) Dilimma Rousseff (B) Angela Merkel
(C) Tu You You (D) Svetlana Alexievich
97. Who was crowned 'Miss World, 2015' ?
- (A) Sofia Nikitchuk (B) Maria Harfanti
(C) Sanneta Myrie (D) Mireia Lalaguna Royo

98. Which is the tallest building in the world ?
- (A) Cayan Tower
 - (B) Burj Ali Arab
 - (C) Burj Khalifa
 - (D) New York State Building
99. Which political party won the Parliamentary Elections held in Poland in October-November, 2015 ?
- (A) Law and Justice Party
 - (B) Civic Party
 - (C) Socialist Party
 - (D) Democratic Party
100. Where did maximum deaths occur during terrorist attack in Paris in November, 2015 ?
- (A) Bataclan theatre
 - (B) Combodian restaurant
 - (C) Football stadium
 - (D) La Kerolin Petit Restaurant