

**DO NOT OPEN THIS TEST BOOKLET UNTIL YOU ARE ASKED TO DO SO**

**TEST BOOKLET**  
**LECT (INST. ENGG.) 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. Write your Roll Number only in the box provided alongside.   
Do not write anything else on the Test Booklet.
3. 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.
4. 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 :  

Ⓐ
Ⓑ
●
Ⓓ
5. 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, no erasing/fluid is allowed.
6. 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.
7. 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.
8. 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.
9. If a candidate gives more than one answer, it will be treated as a wrong answer even if one of the given answers happens to be correct.
10. After you have completed the test, hand over the Answer Sheet only, to the Invigilator.

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1. If two-port network is reciprocal, which of the following is *not true* ?  
(A)  $z_{21} = z_{12}$  (B)  $y_{21} = y_{12}$   
(C)  $h_{21} = h_{12}$  (D)  $AD = BC + 1$
2. A series RLC circuit has  $Q_0 = 5.1$  at its resonant frequency of 100 kHz. Assuming the power dissipation of the circuit is 100 W when drawing a current of 0.8 A, find the bandwidth of the circuit.  
(A) 19.6 kHz (B) 1.96 kHz  
(C) 29.6 kHz (D) None of these
3. The number of f-cuts in a graph is, where  $v$  is number of vertices.  
(A)  $v - 1$  (B)  $v$   
(C)  $v + 1$  (D) None of these
4. If  $f(t) = \sin 10t + \sin 20t$ ; what is the rms value of  $f(t)$  ?  
(A) 1 (B) 0.5  
(C)  $\pi$  (D) 1.414
5. A silicon PN junction is forward biased with a constant current source at room temperature. When the room temperature is increased by  $10^\circ\text{C}$ , the forward bias voltage across the PN junction :  
(A) increases by 60 mV (B) decreases by 60 mV  
(C) increases by 25 mV (D) decreases by 25 mV

6. Drift current in semiconductors depends upon :
- (A) only the electric field
  - (B) only the carrier concentration gradient
  - (C) both the electric field and the carrier concentration
  - (D) both the electric field and the carrier concentration gradient
7. The following is *not* associated with a  $p-n$  junction :
- (A) junction
  - (B) charge storage capacitance
  - (C) depletion capacitance
  - (D) channel length modulation
8. A Zener diode, when used in voltage regulator stabilization circuits, is biased in :
- (A) reverse bias region below the breakdown voltage
  - (B) reverse breakdown region
  - (C) forward bias region
  - (D) forward bias constant current mode
9. The phenomenon known as "Early Effect" in a bipolar transistor refers to a reduction of 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-cut off switching

10. If the differential voltage gain and the common mode gain of a differential amplifier are 50 dB and 4 dB respectively, then its CMRR is :
- (A) 54 dB (B) 12.5 dB  
(C) 46 dB (D) infinite
11. The Cascade amplifier is a multi-stage configuration of :
- (A) CC-CB (B) CE-CB  
(C) CC-CE (D) CC-CC
12. Three identical amplifiers with each having a voltage gain of 50 are cascaded. The open loop circuit voltage gain of the combined amplifier is :
- (A) 49 dB (B) 51 dB  
(C) 98 dB (D) 102 dB
13. Second order notch filter can be realized by adding following filter responses :
- (A) band-pass and all-pass (B) band-pass and low-pass  
(C) band-pass and high pass (D) none of these
14. Which of the following blocks comprise a PLL ?
- (A) VCO (B) Phase detector  
(C) LPF (D) All of these

15. If a non-inverting amplifier is used as a block in realizing an oscillator, then the feedback network must ensure a phase shift of :
- (A)  $180^\circ$  (B)  $90^\circ$   
(C)  $0^\circ$  (D) None of these
16. What is the maximum size of a stack in an 8085 microprocessor ?
- (A) 32 K (B) 256  
(C) Size of RAM (D) 16 K
17. Which is the longest instruction of 8085 microprocessor ?
- (A) JMP instruction (B) CALL instruction  
(C) JNZ instruction (D) LXI H instruction
18. Which logic family is the fastest ?
- (A) TTL (B) ECL  
(C) NMOS (D) DTL
19. In I/O mapped I/O scheme the maximum number of input and output devices that can be connected to 8085 is :
- (A) 512 (B) 256  
(C) 16 K (D) 64 K



24. Compute the step size of an 8-bit A/D converter with full scale voltage of 5 V.
- (A) 0.1 (B) 5 V  
(C) 0.02 V (D) 0.625
25. BJT can deliver larger current than a MOSFET because :
- (A) It is smaller in size than a MOSFET  
(B) It has higher transconductance than a MOSFET  
(C) It has higher output resistance than a MOSFET  
(D) It has lower parasitic capacitances
26. The T input of a Toggle flip-flop is always 1. Its clock frequency is 10 MHz. What is the frequency of the signal available at its Q output ?
- (A) 20 MHz (B) 10 MHz  
(C) 5 MHz (D) Zero
27. How many flip-flops are needed in a 3 state sequential circuit that employs one hot encoding ?
- (A) 3 (B) 2  
(C) 1 (D) None of these



32. For distortionless communication through an LTI system, the phase response of the system should be :
- (A) one  
 (B) zero  
 (C) constant  
 (D) a linear function of the frequency
33. For a system with input  $x[n] = \delta[n - 1]$  and impulse response  $h[n] = \delta[n + 1]$ , the  $z$ -transform of the output is :
- (A)  $z$  (B)  $z^{-1}$   
 (C) 0 (D) 1
34. The frequency response of a system with  $h[n] = \delta[n] - \delta[n - 1]$  is given by :
- (A)  $\delta(e^{j\omega}) - \delta(e^{j(\omega-1)})$  (B)  $1 - e^{j\omega}$   
 (C)  $u(e^{j\omega}) - u(e^{j(\omega-1)})$  (D)  $1 - e^{-j\omega}$
35. The Fourier transform of a signal  $x(t)$  is,  $X(f) = 1/j\pi f$ , then  $x(t)$  is equal to :
- (A)  $u(t)$  (B) 1  
 (C)  $1/\pi t$  (D)  $2u(t) - 1$

36. The gain margin in db for a unity feedback control system, whose open-loop transfer function is :

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

is given by :

- (A) 0 (B) 1  
(C) -1 (D)  $\infty$
37. In servo system, the device used for providing derivative feedback is called :
- (A) Potentiometer (B) Synchro  
(C) Servomotor (D) Tacho generator
38. For the open-loop transfer function of a system,

$$H(s)G(s) = \frac{K(s+10)}{s(s+1)(s+2)},$$

the breakaway point lies between :

- (A) 0 and -1 (B) -1 and -2  
(C) -2 and -10 (D) None of these
39. The open loop transfer function of the control system has one pole in the RHS-plane and its Nyquist plot encircles  $-1 + j0$  point twice in the clockwise direction, then the system is :
- (A) Unstable (B) Stable  
(C) Critically stable (D) Conditionally stable

40.  $\phi(t_0, t_1)$ , the state transition matrix is equivalent to :
- (A)  $-\phi(t_0, t_1)$  (B)  $-\phi(t_1, -t_0)$   
(C)  $\phi^{-1}(t_0, t_1)$  (D)  $\phi^{-1}(t_1, -t_0)$
41. In FM modulation, when the modulation index increases, transmitted power is :
- (A) constant (B) increased  
(C) decreased (D) none of these
42. An earth station transmitter consists of :
- (A) RF to IF down converter (B) IF to RF converter  
(C) Either (A) or (B) (D) None of these
43. The maximum power in AM, when modulation index is :
- (A) 0 (B) 0.5  
(C) 0.7 (D) 1
44. An AM demodulator can be implemented with a linear multiplier followed by a ..... filter.
- (A) low-pass (B) high-pass  
(C) band-pass (D) band-stop
45. The bandwidth of voice grade channel is approximately :
- (A) 4000 Hz (B) 5000 Hz  
(C) 6000 Hz (D) 3000 Hz



50. A rectangular wave guide acts as a :
- (A) Low pass filter (B) High pass filter  
(C) Band pass filter (D) Band stop filter
51. During measurement of voltage and current in a load, if voltmeter and ammeter are interchanged by mistake, then :
- (A) Voltmeter will burn (B) Ammeter will burn  
(C) Both meters will burn (D) None will burn
52. Which instrument is free from stray magnetic fields ?
- (A) MI attraction type (B) MI repulsion type  
(C) Thermal type (D) PMMC type
53. Which type of damping is generally preferred in case of instruments having weak magnetic fields ?
- (A) Air friction damping (B) Fluid friction damping  
(C) Eddy current damping (D) None of these
54. LVDT is always used as :
- (A) Primary transducer (B) Secondary transducer  
(C) Temperature compensator (D) Signal generator

55. A bridge used for the measurement of loss angle of a capacitor is :
- (A) Maxwell's (B) Schering's  
(C) Anderson's (D) Hay's
56. Photoelectric transducer is used for the measurement of :
- (A) Current (B) Temperature  
(C) Pressure (D) Displacement
57. Temperature inside a boiler furnace can be measured by :
- (A) Mercury thermometer  
(B) Bimetallic thermometer  
(C) Liquid hydrogen thermometer  
(D) Optical pyrometer
58. Wagner's earth device is used in a.c. bridges for :
- (A) Eliminating the effect of earth capacitances  
(B) Eliminating the effect of inter-component capacitances  
(C) Eliminating the effect of stray electrostatic fields  
(D) Shielding the bridge elements

59. Which of the following is *not* a transducer ?
- (A) Strain gage (B) Potentiometer  
(C) Thermocouple (D) None of these
60. Semiconductor strain gages have :
- (A) Low fatigue (B) High gage factor  
(C) Linearity (D) Poor hysteresis
61. The principle of operation of Direct connection Q-meter is based on :
- (A) Self inductance (B) Series resonance  
(C) Mutual inductance (D) Parallel resonance
62. Which bridge can only be used for high Q-inductance measurement ?
- (A) Anderson (B) Wien  
(C) Schering (D) Hay
63. High resistance with high accuracy can be measured by :
- (A) Kelvin's double arm bridge (B) Wheatstone's bridge  
(C) Ammeter-Voltmeter (D) Price guard wire method

64. A Hall effect transducer can be used for measurement of :
- (A) Pressure (B) Temperature  
(C) Displacement (D) Strain
65. For fiber optical sensors :
- (A) Single mode transmission is used  
(B) Multimode transmission is used  
(C) Both single and multimode transmission is used  
(D) Not related to mode of transmission
66. In a digital frequency meter, the Schmitt trigger is used for :
- (A) Converting sinusoidal waveform into rectangular pulses  
(B) Scaling of sinusoidal waveform  
(C) Providing time base  
(D) None of the above
67. A digital linear displacement transducer normally uses :
- (A) Straight binary code (B) BCD  
(C) Octal code (D) Hexadecimal code
68. Which one of the following display devices consumes minimum power ?
- (A) Based upon LED (B) Based upon LCD  
(C) Based upon CRT (D) Based upon Nixie tube

69. For the recording of very fast random signals which one of the following instruments will be most successful ?
- (A) Dual trace 40 MHz CRO
  - (B) Sampling oscilloscope
  - (C) Real time spectrum analyzer
  - (D) Scanning type spectrum analyzer
70. Which one of the following transducers is used for accurate and precise measurement of temperature ?
- (A) Thermistor
  - (B) Thermocouple (Alumel/Chromel)
  - (C) Semiconductor temperature chip
  - (D) Platinum resistance thermometer
71. True RMS value Voltmeter is ideal for the determination of RMS value due to which one of the following reasons ?
- (A) It employs two thermocouples
  - (B) It employs high gain amplifier
  - (C) It employs two heaters which are heated by direct current and alternating current
  - (D) It employs feedback

72. Microprocessor is used in instrumentation due to which one of the following reasons ?
- (A) It provides precision which is not possible in analog system
  - (B) It is very easy to design and operate
  - (C) A multifunctional flexible system is possible
  - (D) It is easy to interface
73. Which one of the following primary sensors can work as absolute device for the measurement of differential pressure ?
- (A) Diaphragm with strain gauge
  - (B) U-tube manometer
  - (C) Bourdon tube
  - (D) Bellows
74. For accurate and precise measurement of speed of small motors which one of the following is most suitable ?
- (A) Capacitive transducer
  - (B) Tachometer
  - (C) Inductive pickups
  - (D) Contact type digital encoder
75. Rectifier instruments indicate :
- (A) RMS value
  - (B) Peak value
  - (C) Average value
  - (D) None of these
76. If instrument is to have wide range, the instrument should have :
- (A) Linear scale
  - (B) Square law scale
  - (C) Exponential scale
  - (D) Logarithmic scale

77. The optical sensors may be classified as :
- (A) Intensity and intrinsic types      (B) Interferometric and extrinsic types  
(C) Intrinsic and extrinsic types      (D) All of these
78. Which one of the following materials is used as moving iron piece in a moving iron instrument ?
- (A) Hard magnetic material  
(B) Soft magnetic material in laminated form  
(C) Soft magnetic material in solid shape  
(D) Diamagnetic material
79. On account of the effect of inductance in pressure coil, the dynamometer type Wattmeter at lagging power factor tends to read :
- (A) Low      (B) High  
(C) Erratically      (D) Normally
80. The resolution of a digital ammeter with 4-digit display is :
- (A) 1/10000      (B) 1/1000  
(C) 1/4      (D) 1/2
81. What was the total fruit production in H.P. during 2013-14 (in lakh metric tons) ?
- (A) 7.23      (B) 7.89  
(C) 8.44      (D) 8.64

82. Which one of the following is placed in H.P. on priority under Bharat Nirman Programme ?
- (A) Rural Water Supply (B) Rural literacy  
(C) Rural skill development (D) Rural health
83. How many Kisan Credit Cards have been distributed in H.P. upto September, 2014 ?
- (A) 652463 (B) 648272  
(C) 647292 (D) 643355
84. How many veterinary dispensaries have been opened in H.P. upto December, 2014 under *Mukhyamantri Arogya Pashudhan Yojna* ?
- (A) 1251 (B) 1362  
(C) 1419 (D) 1560
85. When was H.P. Administrative Tribunal first set up ?
- (A) 1985 (B) 1986  
(C) 1987 (D) 1988
86. Which raja of Nurpur was sent by Shah Jahan to fight against Usbegs of Balakh ?
- (A) Rajender Singh (B) Jagat Singh  
(C) Basu Singh (D) Mandhata

87. Who opined in his book *Vedic India* that there was probably a large Dravidian element in the aboriginal population in the hills ?
- (A) Vincent Smith (B) E.J. Rapson  
(C) G.T. Vigue (D) W. Crooks
88. When was Himachal Pradesh made a 'Part-C' State of the Indian Union ?
- (A) 1948 (B) 1949  
(C) 1951 (D) 1952
89. From which source are Kangra paintings mainly drawn ?
- (A) Jai Deva's *Gita Gobind*  
(B) Bihari's *Satsai*  
(C) Keshav Dass' *Rasik Priya*  
(D) All of the above
90. Who is the author of *Polyandry in the Himalayas* ?
- (A) Moorcraft (B) Y.S. Parmer  
(C) O.C. Handa (D) Rahul Sanskritayan
91. Persons of which age-group are eligible under the Pradhan Mantri Suraksha Bima Yojna ?
- (A) 18-70 years (B) 18-75 years  
(C) 20-65 years (D) 25-70 years

92. Who is Pradip Baijal ?
- (A) a film producer  
(B) former TRAI Chief  
(C) former Coal Secretary, Govt of India  
(D) former CBI Director
93. To which state of India does Uralis Tribe belong ?
- (A) Kerala (B) Andamans  
(C) Nicobar (D) Sikkim
94. By which constitutional amendment was Dogri language included in the 8th Schedule of the Indian Constitution ?
- (A) Seventy-first (71) (B) Eighty-third (83)  
(C) Eighty-seventh (87) (D) Ninety-second (92)
95. How many members are there in the Press Council of India ?
- (A) 12 (B) 18  
(C) 25 (D) 28
96. Which Chair was Christopher Alan Bayle holding at the University of Chicago in 2014-15 ?
- (A) Dayananda Professor (B) Vivekananda Professor  
(C) Aurobindo Ghosh Professor (D) Mahatma Gandhi Professor

97. The race horse presented to PM Narendra Modi during his visit to Mangolia has been named Kanthaka. The name is associated with .....
- (A) Shivaji (B) Chandragupta Maurya  
(C) Tipu Sultan (D) Gautam Buddha
98. Which one of the following that were destroyed/damaged during the April, 2015 earthquake in Nepal was the oldest ?
- (A) Dharahara Tower (B) Basantpur Place  
(C) Durbar Squares (D) Kashtha Mandap
99. What award was given to Mazen Darwish (Syrian Journalist) in May, 2015 ?
- (A) Freedom of Expression Award by PEN Centre (USA)  
(B) UNESCO's Press Freedom Award  
(C) Natural History Award (USA)  
(D) Charlie Hebdo Award (France)
100. Between which two places is Solar Plane's Marathon Pacific Flight taking place ?
- (A) Beijing and Alaska (B) Tokyo and Ottawa  
(C) Nanjing and Hawaii (D) Seol and Solomon Islands