

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

**TEST BOOKLET SERIES**

**TEST BOOKLET**  
**AE(ELECT.)/DY. MANAGER HPPTCL-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, no 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 gives 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. Which of the following does *not* change in a transformer ?  
(A) Voltage (B) Current  
(C) Frequency (D) Power factor
  
2. A 10 kVA auto-transformer has turn ratio of 0.4. Find the power transferred inductively :  
(A) 0 kVA (B) 4 kVA  
(C) 6 kVA (D) 10 kVA
  
3. .... makes effective savings on copper and copper losses when its transformation ratio is approximately equal to one.  
(A) Auto-transformer  
(B) Two winding transformer  
(C) Three winding transformer  
(D) Instrument transformer

4. A common method of cooling a power transformer is :
- (A) Oil cooling (B) Natural air cooling  
(C) Air blast cooling (D) Water cooling
5. .... compensation in an EHV line is used to improve the voltage profile.
- (A) Series (B) Shunt  
(C) Active power (D) Any of these
6. SSSC is a ..... FACTS device.
- (A) Shunt-series (B) Shunt-shunt  
(C) Shunt (D) Series
7. The value of boost factor is equal to ..... when TCSC is operated in blocking mode.
- (A) Zero (B) 0.5  
(C) 0.8 (D) Unity

8. If, for a given alternator in economic operation mode, the incremental cost is given by  $IC = 0.012P + 8 \text{ Rs/MW}$ ,  $\frac{dP_L}{dP} = 0.2$  and plant penalty factor  $(\lambda) = 25$ , then the power generation is :
- (A) 750 MW (B) 1000 MW  
(C) 1250 MW (D) 1500 MW
9. In Thevenin's theorem,  $Z_{th}$  is determined by :
- (A) Short-circuiting all independent current and voltage sources  
(B) Open-circuiting all independent current and voltage sources  
(C) Short-circuiting all independent voltage sources and open-circuiting all independent current sources  
(D) Open-circuiting all independent voltage sources and short-circuiting all independent current sources
10. The power delivered to a 3-phase load can be measured by the use of 2 wattmeters only when the :
- (A) Load is balanced  
(B) Load is unbalanced  
(C) 3-phase load is connected to the source through 4 wires  
(D) 3-phase load is connected to the source through 3 wires

11. The rating of a battery is expressed in terms of its ..... capacity.
- (A) Volts (B) Amperes  
(C) Watt-hour (D) Ampere-hour
12. According to IS, ..... colour is used for the neutral wire in a 3-pin socket.
- (A) Red (B) Black  
(C) Green (D) Yellow
13. Normally  $Y_{BUS}$  matrix is a :
- (A) Null matrix (B) Sparse matrix  
(C) Full matrix (D) Unity matrix
14. Compared to Newton-Raphson method, FDLF method takes :
- (A) Less number of iterations and more time per iteration  
(B) Less number of iterations and less time per iteration  
(C) More number of iterations and more time per iteration  
(D) More number of iterations and less time per iteration

15. A line which connects a distributor to substation is called :
- (A) Feeder (B) Service main  
(C) Distributor (D) Any of these
16. ELCB stands for :
- (A) Elevated light circuit block  
(B) Earth leakage circuit breaker  
(C) Earth limit circuit breaker  
(D) Elevated lamp circuit bench
17. For a power plant, the expenditure on which of the following items is expected to be negligible ?
- (A) Wages (B) Insurance  
(C) Publicity (D) Taxes
18. AC servo motor is basically a :
- (A) Two-phase induction motor  
(B) Universal motor  
(C) Capacitor motor  
(D) Three-phase induction motor

19. Opto-coupler is used to :
- (A) Isolate gating circuitry from power lines
  - (B) Protect IGBTs against  $dv/dt$
  - (C) Reduce gate signal
  - (D) Reduce SCR turn-off time
20. A laser diode can readily be pulse-modulated, since the photon life time is ..... than the carrier life time.
- (A) Much higher
  - (B) Higher
  - (C) Smaller
  - (D) Much smaller
21. .... is generally not used in industry.
- (A) DC shunt motor
  - (B) DC series motor
  - (C) Cumulative compound DC motor
  - (D) Differential compound DC motor

22. .... is generally preferred for electric traction.
- (A) DC shunt motor
  - (B) DC series motor
  - (C) Synchronous motor
  - (D) Stepper motor
23. DVR in distribution system is analogous to ..... in transmission system.
- (A) SSSC
  - (B) SVC
  - (C) STATCOM
  - (D) UPFC
24. Relay is a/an :
- (A) Indicating device
  - (B) Switching device
  - (C) Earthing device
  - (D) Modulating device
25. .... is never operated on belt.
- (A) DC shunt motor
  - (B) DC series motor
  - (C) Cumulative compound DC motor
  - (D) Differential compound DC motor



26. .... is dual of twig voltage.
- (A) Link voltage (B) Twig current  
(C) Link current (D) Twig power
27. A ..... can be plotted from chronological load curve.
- (A) Load duration curve  
(B) Mass curve  
(C) Energy load curve  
(D) Both load duration curve and mass curve
28. Power transmission system may also have an impact on the quality of power. This is because the modern transmission systems have a/an low ..... ratio resulting in low system damping.
- (A) Resistance to reactance  
(B) Reactance to resistance  
(C) Reactance to impedance  
(D) Impedance to resistance

29. .... is used in transformer(s) for determining heating information.
- (A) Open circuit test                      (B) Short circuit test
- (C) Polarity test                              (D) Sumpner's test
30. Megger is an instrument for :
- (A) Measuring very low resistance
- (B) Measuring low resistance
- (C) Measuring medium resistance
- (D) Measuring high resistance
31. THD is an index used to measure :
- (A) Harmonics                                  (B) Flicker
- (C) Voltage Sag                                  (D) Over-voltage
32. The responsibility of removing the harmonics introduced in current lies on the shoulders of :
- (A) Electric utility                              (B) Electric consumer
- (C) Both (A) and (B)                              (D) Neither (A) nor (B)

33. A generator bus is treated as a load bus in subsequent iteration when its :
- (A) Voltage limit is violated
  - (B) Active power limit is violated
  - (C) Reactive power limit is violated
  - (D) Phase angle limit is violated
34. The basic electrical requirement in arc welding is that there should be :
- (A) coated electrodes
  - (B) no arc blow
  - (C) dc power supply
  - (D) high open-circuit voltage
35. 3-phase load is said to be balanced when :
- (A) Voltage induced in each phase is equal in magnitude
  - (B) Voltage induced in each phase are displaced by  $120^\circ$  w.r.t. each other
  - (C) Complex load impedance is same for all the 3 phases
  - (D) Both (A) and (B)

36. .... gate is considered as a universal gate.

(A) AND

(B) NAND

(C) OR

(D) NOT

37. Energy consumption per unit GDP is called :

(A) Energy ratio

(B) Energy intensity

(C) Per capita consumption

(D) All of the above

38. A firm switches from a low ash and low moisture fuel to a less expensive high ash and high moisture fuel by retrofitting a furnace. The most likely impact of the measure is :

(A) saves fuel cost and reduces energy consumption

(B) saves fuel cost but increases energy consumption

(C) increases fuel costs and energy consumption

(D) None of the above

39. If the Z parameters of a two-port network are  $Z_{11} = 5 \text{ ohm}$ ,  $Z_{22} = 7 \text{ ohm}$ ,  $Z_{12} = Z_{21} = 3 \text{ ohm}$ , then the A, B, C, D parameters are respectively given by :
- (A)  $5/3, 22/3, 1/3, 7/3$  (B)  $5/3, 26/3, 1/3, 7/3$   
(C)  $10/3, 52/3, 2/3, 14/3$  (D)  $15/3, 78/3, 8/3, 21/3$
40. The reading of the wattmeter connected to measure the active power in a three-phase circuit is given by zero, the line voltage is 400 V and line current is 15 A; then the pf of the circuit is :
- (A) Zero (B) 0.5  
(C) 0.8 (D) Unity
41. The maximum possible mutual inductance of two inductively coupled coils with self-inductances  $L_1 = 36 \text{ mH}$  and  $L_2 = 100 \text{ mH}$  is given by :
- (A) 136 mH (B) 100 mH  
(C) 60 mH (D) 36 mH

42. A solid dielectric of 1.1 cm thickness and dielectric constant  $\epsilon_r = 3.5$  has an internal void of 1 mm thickness. If the void is filled with air which breaks down at 21 kV/cm, determine the voltage at which an internal discharge can occur :
- (A) 0 kV (B) 2.1 kV  
(C) 6 kV (D) 8.1 kV
43. An absolute electrostatic voltmeter has a movable circular plate 9 cm in diameter. Determine the potential difference if the distance between the plates during a measurement is 5 mm and force of attraction is 0.2 gm-wt.
- (A) 1913.39 V (B) 1319.93 V  
(C) 917.9 V (D) 719.7 V
44. A certain 3-phase equilateral transmission line has a total corona loss of 55 kW at 108 kV and a loss of 100 kW at 111 kV. What is the disruptive critical voltage ?
- (A) 57.38 kV (B) 60.73 kV  
(C) 65.83 kV (D) 70.37 kV

45. Paschen's law does not hold good for many gaseous mixtures. The dielectric strength of some mixtures is even smaller than the dielectric strengths of their constituent gases. This phenomenon is known as .....
- (A) Penning effect                      (B) Proximity effect  
(C) Skin effect                          (D) Pinch effect
46. The following point(s) is/are true for x-circles in Smith chart :
- (A) The centre of every r-circle lies on  $\Gamma_r$ -axis  
(B) The circle for which  $r = 0$  is the largest with unity radius and centered at origin.  
(C) As  $r$  increases from 0 to  $\infty$ , the  $r$ -circles become progressively smaller  
(D) All of the above
47. 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

48. In HVDC transmission, there are predominant :
- (A) Current harmonics on ac side and voltage harmonics on dc side of converters
  - (B) Voltage harmonics on ac side and current harmonics on dc side of converters
  - (C) Current harmonics only on the dc side of the converters
  - (D) Voltage harmonics only on the ac side of the converters
49. Brewster's angle is given by  $\theta_B = \tan^{-1}(\dots\dots\dots)$ .
- (A)  $\sqrt{\frac{\epsilon_1}{\epsilon_2}}$
  - (B)  $\sqrt{\frac{\epsilon_2}{\epsilon_1}}$
  - (C)  $\sqrt{\epsilon_1 \epsilon_2}$
  - (D) none of these
50. Poynting Vector P is given by :
- (A)  $E + H$
  - (B)  $E - H$
  - (C)  $E \cdot H$
  - (D)  $E \times H$



51. In ..... mode, the magnetic field  $H$  is transverse to the direction of propagation.
- (A) TM (B) TE  
(C) TEM (D) None of these
52. According to Maxwell's curl equation for electric field .....
- (A)  $\nabla \cdot E = 0$  (B)  $\nabla \times E = 0$   
(C)  $\nabla \cdot E = \frac{Q}{\epsilon}$  (D)  $\nabla \cdot E = \rho_v$
53. In a negative feedback system with loop gain  $T$ , the noise as input to the amplifier leads to :
- (A) Increase in S/N ratio by  $(1-T)$   
(B) Decrease in S/N ratio by  $(1 + T)$   
(C) Increase in S/N ratio by  $(1 + T)$   
(D) No effect on S/N ratio

54. The overshoot of the system,  $\frac{16k}{s(s^2 + 2s + 16)}$  for a step unit input applied would be :

- (A) 10% (B) 20%  
(C) 40% (D) 60%

55. An amplifier with the characteristic equation  $s^4 + 3s^3 + 6s^2 + 3s + 1$  would be :

- (A) Absolutely stable  
(B) Relatively stable  
(C) Relatively unstable  
(D) Absolutely unstable

56. If stability error for step input and speed of response be the criteria for design, what type of controller would you recommend ?

- (A) P controller (B) PD controller  
(C) PI controller (D) PID controller

57. In its application, an SUS behaves in the same way as :
- (A) UJT (B) SCR  
(C) Tunnel diode (D) None of these
58. In a single-phase full converter, if load current is  $I$  and ripple free, then average thyristor current is :
- (A)  $I/2$  (B)  $I/3$   
(C)  $I/4$  (D)  $I$
59. In single-pulse modulation of PWM inverters, fifth harmonic can be eliminated if pulse width is equal to :
- (A)  $30^\circ$  (B)  $36^\circ$   
(C)  $72^\circ$  (D)  $108^\circ$
60. In dc choppers, for chopping period  $T$ , the output voltage can be controlled by FM by varying :
- (A)  $T$  keeping  $T_{on}$  constant (B)  $T_{on}$  keeping  $T$  constant  
(C)  $T_{off}$  keeping  $T$  constant (D) None of these

61. Which one of the following is custom power device ?
- (A) IPFC (B) STATCOM
- (C) SPS (D) UPQC
62. For an amplifier, the coupling method which gives the highest gain is :
- (A) Capacitance coupling
- (B) Resistance coupling
- (C) Impedance coupling
- (D) Transformer coupling
63. Number 1000 is stored in a shift right register. If two right-shift pulses are applied, the number in the register will become :
- (A) 10000 (B) 0100
- (C) 0010 (D) 100000

64. Bearings used to support axles of rolling stock are :
- (A) Bush bearings                      (B) Journal bearings
- (C) Ball bearings                        (D) Roller bearings
65. A rectifier for welding has voltage/current characteristics as :
- (A) Rising                                (B) Drooping
- (C) Static                                 (D) Variable
66. The consumption of M.I. instrument as compared to M.C. instrument is :
- (A) very small                         (B) less
- (C) same                                 (D) more
67. A 10 MHz CRO has :
- (A) 5 MHz sweep
- (B) 10 MHz vertical oscillator
- (C) 10 MHz horizontal oscillator
- (D) 10 MHz supply frequency

68. The instrument used to measure frequency in wave guides is :
- (A) Bolometer (B) Cavity resonator  
(C) Galometer (D) Klystron
69. In the ring main distribution system, the distributor is fed :
- (A) By one feeder (B) By two feeders  
(C) At different points (D) By four feeders
70. The spacing between phase conductors of a 220 kV line is approximately equal to :
- (A) 2 m (B) 3.5 m  
(C) 6 m (D) 8.5 m
71. The loss load factor is given by (if  $F$  is the load factor) :
- (A)  $0.25 F + 0.75 F^2$  (B)  $0.25 F^2 + 0.75 F$   
(C)  $0.7 F + 0.35 F^2$  (D)  $0.35F + 0.7 F^2$

72. Reactors are used at various points in the power system to :

- (A) Limit short circuit current
- (B) Increase short circuit current
- (C) Avoid short circuit
- (D) None of the above

73. Back-up protection is used to protect :

- (A) Overvoltages
- (B) Overcurrents
- (C) Transient current
- (D) Short-circuits

74. The diameter of a 50 SWG wire is closer to :

- (A) 0.0253 mm
- (B) 0.05 mm
- (C) 0.16 mm
- (D) 0.52 mm

75. Which of the following logics has excellent noise margin ?

- (A) TTL
- (B) ECL
- (C) CMOS
- (D) All of these

76. Which of the following circuits exhibits memory ?
- (A) Astable multivibrator
  - (B) Bistable multivibrator
  - (C) NAND gate
  - (D) XOR gate
77. An increase in the modulation index leads to increase in bandwidth in case of :
- (A) AM
  - (B) FM
  - (C) PM
  - (D) both FM and PM
78. A change of 5% in supply voltage to a 3-phase induction motor will produce the approximate change in the torque of :
- (A) 5%
  - (B) 7.5%
  - (C) 10%
  - (D) 25%



79. Active power is a function of .....
- (A) Voltage phase angle
  - (B) Voltage magnitude
  - (C) Reactive power
  - (D) Reactance
80. The direction of rotation in a shaded-pole motor is always towards the :
- (A) Salient pole
  - (B) Consequent pole
  - (C) Main pole
  - (D) Shaded pole
81. Which mountain pass joins Lahaul with Zaskar ?
- (A) Shing dkon
  - (B) Kugti
  - (C) Kunjam
  - (D) None of these
82. Which raja of Mandi princely state founded the Mandi town ?
- (A) Bahu Sen
  - (B) Ban Sen
  - (C) Ajbar Sen
  - (D) Bir Sen

83. When was the treaty of Lahore signed between the British Government and the Sikhs by which the Sikhs ceded to the British Government all hill territories south of Satluj ?
- (A) 1815 AD (B) 1842 AD  
(C) 1846 AD (D) 1849 AD
84. According to a story in Mahabharata the Audumbaras are the descendants of .....
- (A) Vashishtha (B) Vishvamitra  
(C) Vyasa (D) Jamdagini
85. With which region of H.P. is Bonyangchu folk-dance associated ?
- (A) Sirmaur (B) Chamba  
(C) Kinnaur (D) Kangra

86. Who among the following was *not* associated with Mandi conspiracy of 1914-15 ?

- (A) Shobha Ram
- (B) Mian Jawahar Singh
- (C) Hardev
- (D) Mathra Dass

87. When was the title of ruler of Keonthal princely state raised/changed from 'Rana' to 'Raja' ?

- (A) 1857 AD
- (B) 1902 AD
- (C) 1911 AD
- (D) 1917 AD

88. On which river/stream is Chambapattan bridge ?

- (A) Ravi
- (B) Siul
- (C) Chenab
- (D) None of these

89. When was Pradhan Mantri Jeevan Jyoti Bima Yojna launched ?
- (A) November, 2014 (B) February, 2015
- (C) May, 2015 (D) July, 2015
90. In which river basin is Sissu Hydel Power Project ?
- (A) Chenab (B) Ravi
- (C) Beas (D) Yamuna
91. How many votes of the Electoral College were needed by Donald Trump to get elected as the President of the U.S.A. ?
- (A) 219 (B) 270
- (C) 319 (D) None of these
92. Who is the President of Israel ?
- (A) Reuven Rivlin
- (B) Michael D. Hingins
- (C) Park Geun-hye
- (D) Raimonds Vejonis

93. Around which date did the U.K. vote to leave the European Union ?
- (A) May 10 (B) June 23  
(C) July 28 (D) August 14
94. Where is the Headquarters of the Interpol (International Police Organisation) ?
- (A) Milan (Italy) (B) Lyon (France)  
(C) Oslo (Norway) (D) Cologne (Germany)
95. Who succeeded Ban-Ki-Moon as the Secretary-General of the United Nations ?
- (A) Rodriga Duterte  
(B) Antonio Guterres  
(C) Anibal Cavaco Silva  
(D) None of the above

96. Around which year was the State Bank of Saurashtra merged with the SBI -  
(State Bank of India) ?
- (A) 2008 (B) 2010  
(C) 2012 (D) 2014
97. Which of the following countries did not participate in the Four Nation Hockey  
Tournament held in Australia on November 23, 2016 ?
- (A) Malaysia (B) New Zealand  
(C) Pakistan (D) India
98. How many women pilots of India are participating in National Paragliding  
Accuracy Championship being held at Billing in Kangra District of  
H.P. ?
- (A) None (B) One  
(C) Two (D) Three

99. Which day is observed in India as *Kisan Divas* ?

(A) December 05

(B) December 07

(C) December 16

(D) December 23

100. Which nationalist leader is called *Punjab Kesari* ?

(A) Bhagat Singh (Shaheed)

(B) Lala Lajpat Rai

(C) Hardyal

(D) Madan Lal Dhingra