

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

**TEST BOOKLET**  
**A.E. (E) HPPCL-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. HVDC transmission systems generally use :
- (A) 12 pulse converters
  - (B) 6 pulse converters
  - (C) 3 pulse converters
  - (D) Either 12 or 6 pulse converters
2. In auxiliary commutated chopper fed by Voltage  $V$  and having  $L$  and  $C$  commutating elements, the peak value of capacitor current is :
- (A)  $\frac{VC}{L}$
  - (B)  $\frac{VC}{\sqrt{L}}$
  - (C)  $V\sqrt{\frac{C}{L}}$
  - (D)  $\sqrt{\frac{VC}{L}}$
3. A load commutated chopper circuit has :
- (A) one thyristor
  - (B) two thyristors
  - (C) four thyristors
  - (D) six thyristors
4. The power factor at the input terminals of a cycloconverter is generally :
- (A) low and leading
  - (B) low and lagging
  - (C) high and leading
  - (D) high and lagging

5. A synchronous operation between two systems of different frequencies is possible for :
- (A) A dc link (B) A low voltage ac link  
(C) A high voltage ac link (D) None of these
6. A 66 kV system has string insulator having five discs and the earth to disc capacitance ratio of 0.10. The string efficiency will be :
- (A) 89% (B) 75%  
(C) 67% (D) 55%
7. A 100 km transmission line is designed for a nominal voltage of 132 kV and consists of one conductor per phase. The line reactance is  $0.726 \Omega/\text{km}$ . The static transmission capacity, in megawatts, would be :
- (A) 132 (B) 240  
(C) 416 (D) 720
8. While using an air-blast circuit breaker, current chopping is a phenomenon often observed when :
- (A) A long overhead line is switched off  
(B) A bank of capacitors is switched off  
(C) A transformer on no-load is switched off  
(D) A heavy load is switched off



9. The most efficient torque-producing actuating structure for induction-type relays :
- (A) Shaded pole structure
  - (B) Watt-hour-meter structure
  - (C) Induction-cup structure
  - (D) Single induction loop structure
10. A lightning arrester connected between line and earth in power system :
- (A) Protects the terminal equipment against travelling surge
  - (B) Protects the terminal equipment against direct lightning stroke
  - (C) Suppresses high frequency oscillations in the line
  - (D) Reflects back the travelling waves approaching it
11. The transient stability limit of a power system can be appreciably increased by introducing :
- (A) series inductance
  - (B) shunt inductance
  - (C) series capacitance
  - (D) shunt capacitance

12. In a power station, the cost of generation of power reduces most effectively :
- (A) Diversity factor alone increases
  - (B) Both diversity factor and load factor increase
  - (C) Load factor alone increases
  - (D) Both diversity factor and load factor decrease
13. For the same voltage drop, increasing the voltage of distributor  $n$ -times :
- (A) Reduces the  $x$ -section of the conductor by  $n$ -times
  - (B) Increases the  $x$ -section of the conductor by  $n$ -times
  - (C) Reduces the  $x$ -section of the conductor  $n^2$  times
  - (D) Increases the  $x$ -section of the conductor  $n^2$  times
14. If a 132 kV line passes over a residential building, the minimum vertical clearance from the roof of the building shall be :
- (A) 4.57 m
  - (B) 5 m
  - (C) 6 m
  - (D) 3 m
15. Which of the following affects the corona least ?
- (A) Mean free length
  - (B) Atmospheric temperature
  - (C) Number of ions
  - (D) Size and charge per ion

16. A 160 km, 110 kV transmission line falls under the category of :
- (A) Short transmission line                      (B) Medium transmission line  
(C) Long transmission line                      (D) Ultra-high voltage line
17. A circuit breaker under normal conditions should be inspected once in :
- (A) A week    (B) A month  
(C) 3 or 6 months                                      (D) 5 years
18. Directional over current relay is used for protection of :
- (A) Long transmission line                      (B) Large power transformer  
(C) Ring main distribution line                      (D) Radial distribution line
19. Location of lightning arrester is near a :
- (A) Generator    (B) Transformer  
(C) Bus-bar    (D) Circuit breaker
20. The inertia constant of a 100 MVA, 11 kV water wheel generator is 4. The energy stored in the rotor at the synchronous speed is :
- (A) 400 MJ    (B) 400 kJ  
(C) 25 MJ    (D) 25 kJ

21. A lap wound armature winding, fitted with a commutator and a pair of brushes on it is rotated at a speed  $N_r$  in a rotating magnetic field having  $P$  poles and rotating at a speed  $N_f$  in a space  $N_f$  and  $N_r$  both being in the same direction. The frequency of induced voltage across the brushes on the commutator is :

(A)  $\frac{N_f P}{120}$

(B)  $\frac{(N_f - N_r) P}{120}$

(C)  $\frac{(N_f + N_r) P}{120}$

(D)  $\frac{N_r P}{120}$

22. Laminated yoke in dc motor can reduce :

(A) Speed regulation

(B) Iron loss

(C) Temperature rise

(D) Sparking on load

23. A 250 V dc generator is run at rated speed with no excitation. The open circuit voltage will be :

(A) Zero

(B) Very small, say about 2 or 3 V

(C) About 100 V

(D) 250 V

24. A dc shunt generator having a shunt field of  $50 \Omega$  was generating normally at 1000 rpm. The critical resistance of the machine was  $80 \Omega$ . Due to some reasons, the speed of the prime-mover becomes such that the generator just failed to operate. The speed at that time must have been :
- (A) 1600 rpm (B) 800 rpm  
(C) 625 rpm (D) 500 rpm
25. The current flowing through armature conductor of a dc motor is :
- (A) Pulsating (B) dc  
(C) ac (D) None of these
26. In a Ward-Leonard drive, if the field current of the dc generator is suddenly reduced, the controlled dc motor operates :
- (A) Still in motoring mode  
(B) In dynamic braking mode  
(C) In counter-current braking mode  
(D) In regenerative braking mode
27. The efficiency of power transformer is :
- (A) 50% (B) 60%  
(C) 80% (D) 95%



28. At 50 Hz operation, a single phase transformer has hysteresis loss of 200 W and eddy current loss of 100 W. Its core loss at 60 Hz operation will be :
- (A) 432 W (B) 408 W  
(C) 384 W (D) 360 W
29. The efficiency of two identical transformers under load conditions can be determined by :
- (A) Back to back test (B) Open-circuit test  
(C) Short-circuit test (D) Any of these
30. Two mechanically coupled alternators deliver power at 50 Hz and 60 Hz respectively. The highest speed of the alternators is :
- (A) 3,600 rpm (B) 3,000 rpm  
(C) 600 rpm (D) 500 rpm
31. A synchronous machine connected to a power system grid bus-bar is operating as a generator. To make the machine operate as motor :
- (A) Direction of rotation is to be reversed  
(B) Phase-sequence is to be changed  
(C) Field excitation is to be decreased  
(D) Mechanical input is to be less than the losses at the shaft

32. When a synchronous motor is running at synchronous speed, the damper winding produces :
- (A) Damping torque
  - (B) Eddy current torque
  - (C) Torque aiding the developed torque
  - (D) No torque
33. A voltmeter gives 120 oscillations per minute when connected to the rotor of an induction motor. The stator frequency is 50 Hz. The slip of the motor is :
- (A) 2%
  - (B) 2.5%
  - (C) 4%
  - (D) 5%
34. Semi-closed or totally closed slots are used in induction motor essentially to :
- (A) Improve pull-down torque
  - (B) Increase pull-out torque
  - (C) Increase efficiency
  - (D) Reduce magnetizing current and improve power factor

35. In a shaded-pole motor, shading coils are used to :
- (A) Reduce winding losses
  - (B) Reduce friction losses
  - (C) Produce rotating magnetic field
  - (D) Protect against sparking
36. The translator program that converts source code in high level language into machine code line by line is called :
- (A) Assembler
  - (B) Compiler
  - (C) Loader
  - (D) Interpreter
37. In a 8 bit micro-computer, the fetch cycles required to fetch an 8 byte instruction will be :
- (A) 2
  - (B) 4
  - (C) 8
  - (D) Depends upon the design of micro-computer

38. What will be the contents of register AL, after the following has been executed
- ```
MOV BL, 8C  
MOV AL, 7E  
ADD AL, BL
```
- (A) OA and carry flag is set                      (B) OA and carry flag is reset  
(C) 6A and carry flag is set                      (D) 6A and carry flag is reset
39. 8251 is a :
- (A) UART  
(B) USART  
(C) Programmable Interrupt Controller  
(D) Programmable Interval timer/counter
40. In 80186, the timer which connects to system clock :
- (A) Timer 0                                              (B) Timer 1  
(C) Timer 2                                              (D) Any one can be connected
41. A zero to 300 V voltmeter has an error of  $\pm 2\%$  of the full scale deflection. If the true voltage is 30 V, the range of readings on this voltmeter would be :
- (A) 20 V to 40 V                                      (B) 24 V to 36 V  
(C) 29.4 V to 30.6 V                              (D) 29.94 V to 30.06 V



42. The term artificial aging in instrument is associated with :
- (A) Springs (B) Permanent magnets  
(C) Controlling torques (D) Damping
43. Which of the following instruments is free from hysteresis and eddy current errors ?
- (A) Moving iron instrument  
(B) Electrostatics instrument  
(C) Moving coil permanent magnet type instrument  
(D) Moving coil dynamometer type instrument
44. In two wattmeter method of power measurement, one of the wattmeters will show negative reading when the load power factor angle is strictly :
- (A) Less than  $30^\circ$  (B) Less than  $60^\circ$   
(C) Greater than  $30^\circ$  (D) Greater than  $60^\circ$
45. The input impedance of CRO is nearly :
- (A) Zero (B)  $10 \Omega$   
(C)  $100 \Omega$  (D)  $1 \text{ M}\Omega$

46. Insulation used in commutator is :
- (A) Wood (B) PVC  
(C) Mica (D) Glass
47. The possible breakdown in solid dielectrics may be :
- (A) Electro-thermal (B) Electro-chemical  
(C) Purely electrical (D) All of these
48. The materials which exhibit the same elastic properties in all directions are called as :
- (A) Isotropic (B) Isentropic  
(C) Rubbers (D) Creep elastics
49. The life of an insulating material is affected by :
- (A) Voltage application (B) Heat  
(C) Chemical action (D) All of these
50. Which of the following gases is classified as electro-negative ?
- (A) Sulphur hexafluoride (B) Methane  
(C) Ethane (D) Nitrogen

51. The frequency and time domain are related through :
- (A) Laplace Transform
  - (B) Fourier Integral
  - (C) Laplace Transform and Fourier Integral
  - (D) None of the above
52. If unit step function is applied to first order system, the steady state error will be :
- (A) T
  - (B) Zero
  - (C) Unity
  - (D) Varying with time
53. The damping ratio of the characteristic equation  $s^2 + 2s + 8 = 0$  :
- (A) 0.353
  - (B) 0.350
  - (C) 0.30
  - (D) 0.333
54. Considering the root locus diagram for system with

$$G(s) = \frac{K(s + 5)}{s(s + 2)(s + 4)(s^2 + 2s + 4)}$$

the meeting points of the asymptotes on the real axis occur at :

- (A) -1.2
- (B) -0.85
- (C) -1.05
- (D) = 0.75





59. Lag compensation improves appreciably the :
- (A) Steady state frequency                      (B) Transient response
- (C) Both (A) and (B)                              (D) None of these
60. In Routh-Hurwitz criterion, if all the elements in one row are zero, then there are :
- (A) Pairs of conjugate roots on imaginary axis
- (B) Pairs of equal roots with opposite sign
- (C) Conjugate roots forming a quadrate in the s-plane
- (D) All of the above
61. In a travelling electromagnetic wave, E and H vector fields :
- (A) Perpendicular in space
- (B) Parallel in space
- (C) E is in direction of wave travel
- (D) H is in direction of wave travel
62. The intrinsic impedance of free space is :
- (A)  $75 \Omega$                                               (B)  $73 \Omega$
- (C)  $120 \pi \Omega$                                         (D)  $377 \Omega$

63. Poisson's equation is given by :

(A)  $\nabla^2 V = \frac{-\rho}{\epsilon}$

(B)  $\nabla^2 V = -4\pi\sigma$

(C)  $\nabla^2 V = -4\pi\rho$

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

64. Poynting vector gives :

(A) Rate of energy flow

(B) Direction of polarization

(C) Intensity of electric field

(D) Intensity of magnetic field

65. Superposition theorem is applicable only to networks that are :

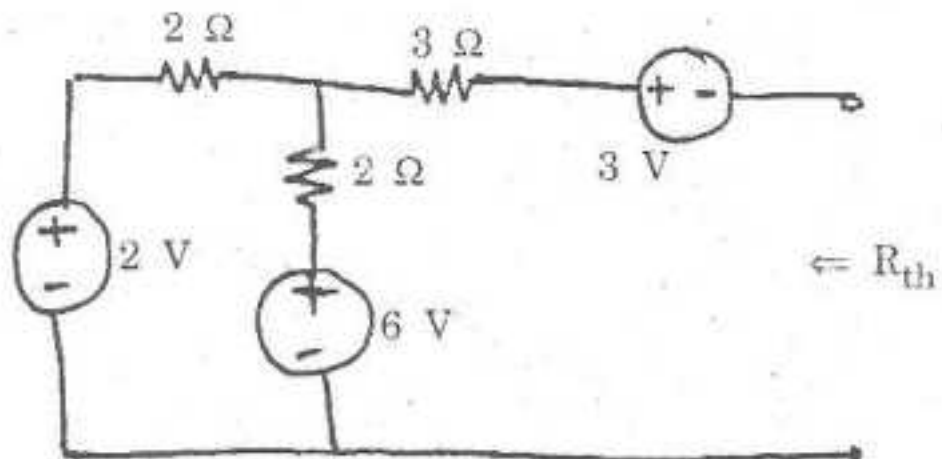
(A) Linear

(B) Nonlinear

(C) Time-invariant

(D) Passive

66. The Thevenin's equivalent resistance  $R_{th}$  for the given network :



(A) 2 Ω

(B) 3 Ω

(C) 4 Ω

(D) 5 Ω

67. Two inductors of value  $L_1$  and  $L_2$  are coupled by mutual inductance  $M$ . By interconnection of the two elements one can obtain the maximum inductance of :

(A)  $L_1 + L_2 - M$

(B)  $L_1 + L_2$

(C)  $L_1 + L_2 + M$

(D)  $L_1 + L_2 + 2M$

68. The poles of Butterworth polynomial lie on :

(A) A parabola

(B) A left semicircle

(C) A right semicircle

(D) An ellipse

69. A two port network using  $Z$  parameter representation is said to be reciprocal if :

(A)  $Z_{11} = Z_{22}$

(B)  $Z_{12} = Z_{21}$

(C)  $Z_{12} = -Z_{21}$

(D)  $Z_{11}Z_{22} - Z_{12}Z_{21}$

70. The coupling between two magnetically coupled coils is said to be ideal if the coefficient of coupling is :

(A) 0

(B) 0.1

(C) 1

(D) 2

71. Three identical impedances are connected in delta to a 3-phase supply of 400 V. The line-current is 34.65 A and the total power taken is 14.4 kW. The resistance of load in each phase in ohms is :
- (A) 20 (B) 16  
(C) 12 (D) 10
72. The NAND gate output will be low if the two inputs are :
- (A) 00 (B) 01  
(C) 10 (D) 11
73. How many flip-flops are required for mod-16 counter ?
- (A) 5 (B) 6  
(C) 3 (D) 4
74. Which of the following is the fastest logic ?
- (A) TTL (B) ECL  
(C) CMOS (D) LSI



75. In applications where measurement of a physical quantity is involved, the OPAMP circuit recommended is :
- (A) Basic non-inverting amplifier
  - (B) Comparator
  - (C) Active filter
  - (D) Instrumentation amplifier
76. A notch filter is :
- (A) Wide band pass filter
  - (B) Narrow band pass filter
  - (C) Wide band reject filter
  - (D) Narrow band reject filter
77. For thyristors, plug triggering is preferred to dc triggering because :
- (A) Gate dissipation is low
  - (B) Pulse system is simpler
  - (C) Triggering system is required for very short duration
  - (D) All of the above
78. In constant source inverter, if frequency of output voltage is  $f$  Hz, then frequency of voltage input to constant source inverter is :
- (A)  $f$
  - (B)  $2f$
  - (C)  $3f$
  - (D)  $4f$

79. In dc choppers, per unit ripple is maximum when duty cycle  $\alpha$  is :
- (A) 0.2 (B) 0.5  
(C) 0.7 (D) 0.8
80. The single pulse modulation of PWM inverters, third harmonics can be eliminated if the pulse width is equal to :
- (A)  $30^\circ$  (B)  $60^\circ$   
(C)  $120^\circ$  (D) None of these
81. According to 2011 Census which District of H.P. has lowest literacy among females ?
- (A) Kinnaur (B) Kullu  
(C) Chamba (D) Lahul-Spiti
82. In which District of H.P. is Bhangyani temple ?
- (A) Bilaspur (B) Solan  
(C) Sirmaur (D) Kullu
83. Who founded the Guler princely state ?
- (A) Mauj Chand (B) Hari Chand  
(C) Rattan Chand (D) Nand Chand

84. With which region of H.P. is Shegtsun festival mainly associated ?
- (A) Kinnaur (B) Sirmaur  
(C) Una (D) Lahul-Spiti
85. To which deity is Nawala festival dedicated ?
- (A) Kali (B) Shiva  
(C) Ganesha (D) Visnu
86. How much subsidy is given by the H.P. Government on Poly houses ?
- (A) 70 percent (B) 75 percent  
(C) 80 percent (D) 85 percent
87. In which river basin is Rukti Hydel Project ?
- (A) Satluj (B) Ravi  
(C) Beas (D) Yamuna
88. What is the maximum distance upto which HRTC allows discount of passengers during return journey under its Green Card Scheme ?
- (A) 30 kms (B) 40 kms  
(C) 50 kms (D) 60 kms

89. Who was the first Chief Justice of H.P. High Court ?
- (A) Justice R.S. Pathak (B) Justice T.U. Mehta
- (C) Justice M.H. Beg (D) Justice V.D. Misra
90. With which region of H.P. is Kayang dance mainly associated ?
- (A) Bilaspur (B) Sirmaur
- (C) Una (D) Kinnaur
91. Which North-Eastern State of India has largest number of Districts ?
- (A) Asom (B) Arunachal Pradesh
- (C) Nagaland (D) Meghalaya
92. What is major religion of Lakshadweep ?
- (A) Hinduism (B) Islam
- (C) Christianity (D) Jewish

93. When was the river Ganga declared a National River ?
- (A) 2001 AD (B) 2003 AD
- (C) 2008 AD (D) 2014 AD
94. When was Jan Dhan Yojna launched in India ?
- (A) August, 2014 (B) October, 2014
- (C) December, 2014 (D) January, 2015
95. When was Press Council of India set up ?
- (A) 1955 AD (B) 1966 AD
- (C) 1977 AD (D) 1988 AD
96. Which President of U.S.A. became the Chief Justice of the Supreme Court after the end of his Presidential term ?
- (A) William Howard Taft (B) Calvin Coolidge
- (C) Herbert Clark Hoover (D) Grover Cleveland



97. To which country did Miss Ariadna Gutierrez who was wrongly declared Miss Universe 2015 belong ?
- (A) Thailand (B) Philippines  
(C) Columbia (D) Ireland
98. What is the currency of People's Republic of China ?
- (A) Renminbi Yuan (B) Won  
(C) Yen (D) Kip
99. Who is the author of Doctor Zhivago ?
- (A) Stephen King (B) George Bernard Shaw  
(C) Boris Pasternak (D) Alexander Solzhenitsyn
100. How many member nations did UN have when it was founded ?
- (A) 48 (B) 51  
(C) 63 (D) 74