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T. B. C. : AE(E) – 2/2015

Test Booklet Series

Serial No.

17941

A

TEST BOOKLET

ASSISTANT EXECUTIVE ENGINEER

ELECTRICAL ENGINEERING (PAPER – II)

Time Allowed : 3 Hours

Maximum Marks : 180

: INSTRUCTIONS TO CANDIDATES :

1. IMMEDIATELY AFTER THE COMMENCEMENT OF THE EXAMINATION, YOU SHOULD CHECK THAT THIS 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 OF THE SAME SERIES ISSUED TO YOU.
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 USING BALL POINT PEN (BLUE OR BLACK).
3. You have to enter your **Roll No.** on the Test Booklet in the Box provided alongside. **DO NOT** write *anything else* on the Test Booklet.
4. This Test Booklet contains **90** items (questions). Each item (question) comprises four responses (answers). You have to select the correct response (answer) which you want to mark (darken) on the Answer Sheet. In case, you feel that there is more than one correct response (answer), you should mark (darken) the response (answer) which you consider the best. In any case, choose **ONLY ONE** response (answer) for each item (question).
5. You have to mark (darken) all your responses (answers) **ONLY** on the **separate Answer Sheet** provided, by using **BALL POINT PEN (BLUE OR BLACK)**. See instructions in the Answer Sheet.
6. All items (questions) carry equal marks. All items (questions) are compulsory. Your total marks will depend only on the number of correct responses (answers) marked by you in the Answer Sheet. **There will be no negative marking for wrong answer.**
7. Before you proceed to mark (darken) in the Answer Sheet the responses to various items (questions) in the Test Booklet, you have to fill in some particulars in the Answer Sheet as per the instructions in your **Admission Certificate**.
8. After you have completed filling in all your responses (answers) on the Answer Sheet and after conclusion of the examination, you should hand over to the Invigilator the *Answer Sheet* issued to you. You are allowed to take with you the candidate's copy/second page of the Answer Sheet along with the *Test Booklet* after completion of the examination for your reference.

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SEAL

1. In hydropower stations, an enlarged body of water just above the intake and used to regulate the reservoir is called :
 - (A) Spillways
 - (B) Forebay
 - (C) Reservoir
 - (D) Penstock
2. Which one of the following fuels is used by the slow thermal nuclear reactors for power generation ?
 - (A) U235
 - (B) U238
 - (C) Th232
 - (D) Pu239
3. When is the Ferranti effect on long overhead lines experienced ?
 - (A) The line is lightly loaded
 - (B) The line is heavily loaded
 - (C) The line is fully loaded
 - (D) The power factor is unity
4. The main criterion for selection of the size of a distribution for a radial distribution system is :
 - (A) Voltage drop
 - (B) Corona loss
 - (C) Temperature rise
 - (D) Capital cost
5. A graphical representation of the discharge and time is known as :
 - (A) Load curve
 - (B) Load duration curve
 - (C) Monograph
 - (D) Hydrograph
6. Bundled conductors are mainly used in high voltage overhead transmission lines to :
 - (A) Reduce transmission line losses
 - (B) Reduce corona
 - (C) Increase mechanical strength of the line
 - (D) Reduce sag
7. Ring main distribution is preferred to a radial system because :
 - (A) Voltage drop in the feeder is less and supply is more reliable
 - (B) Voltage drop in the feeder is less and power factor is high
 - (C) Power factor is high and supply is more reliable
 - (D) Power factor is high and system is less expensive
8. The per unit value of a 4Ω resistor at 100 MVA base and 10 KV base voltage is :
 - (A) 2 P. U.
 - (B) 4 P. U.
 - (C) 0.4 P. U.
 - (D) 40 P. U.

9. The SLG fault current in the faulted phase is 300A, the zero sequence current is :
- (A) Zero
(B) 300A
(C) 100A
(D) 66.6A
10. Zero sequence current does not exist in the following fault :
- (A) L-G
(B) L-L
(C) L-L-G
(D) L-L-L-G
11. For a fault in a power system, the term critical clearing time is related to :
- (A) Reactive power limit
(B) Transient stability limit
(C) Short circuit current limit
(D) Steady state stability limit
12. Load frequency control is achieved by properly matching the individual machines :
- (A) Reactive power
(B) Generated voltages
(C) Turbine inputs
(D) Turbine and generator ratings
13. A power station has installed capacity 300 MW. Its capacity factor is 50% and its load factor is 75%. Its maximum demand is :
- (A) 100 MW
(B) 150 MW
(C) 200 MW
(D) 250 MW
14. If the fault current is 3000A for a relay with a plug setting of 50% and CT ratio of 1000 : 1, the plug setting multiplier would be :
- (A) 1.5
(B) 3
(C) 4.5
(D) 6
15. A negative sequence relay is commonly used to protect :
- (A) An alternator
(B) A transformer
(C) A transmission line
(D) A busbar
16. In thermal plants, the steam energy is converted into mechanical energy by means of :
- (A) Boiler
(B) Condenser
(C) Reactor
(D) Steam turbine

17. The rotor used in alternators of Hydroelectric Station is :
- (A) Cylindrical rotor
 - (B) Salient pole rotor
 - (C) Non-salient pole rotor
 - (D) Round rotor with AC excitation
18. The fuel used in the nuclear power station is :
- (A) Uranium
 - (B) Coal
 - (C) Diesel oil
 - (D) Water
19. Effect of water hammer is reduced by using :
- (A) Spill ways
 - (B) Surge tank
 - (C) An anvil
 - (D) Dam
20. In an inter-connected grid system, the diversity factor of whole system :
- (A) Decreases
 - (B) Increases
 - (C) Remains same
 - (D) None of the above
21. A uniformly loaded DC distributor is fed at both ends with equal voltages. As compared to a similar distributor fed at one end only, the drop at the middle point is :
- (A) One fourth
 - (B) One third
 - (C) One half
 - (D) Twice
22. Which Circuit Breaker (CB) is preferred for the interruption of high voltage and low current ?
- (A) Oil CB
 - (B) Air blast CB
 - (C) Vacuum CB
 - (D) All of the above
23. Reactance relay is normally preferred for protection against :
- (A) Earth faults
 - (B) Phase faults
 - (C) Open circuit faults
 - (D) None of the above
24. Which relay is used to detect and protect internal faults of a transformer ?
- (A) Buchholz relay
 - (B) Directional relay
 - (C) Thermal relay
 - (D) Distance relay

25. The inductance of a power transmission line increases with :

- (A) Decrease in line length
- (B) Increase in diameter of conductor
- (C) Increase in spacing between the phase conductors
- (D) Increase in load current carried by the conductors

26. Function of Zener diode is to provide _____ to galvanometer circuit.

- (A) Constant voltage
- (B) Constant current
- (C) Variable voltage
- (D) Variable current

27. Thyristor is a _____ layer _____ junction p-n-p-n semiconductor switching device.

- (A) 3, 4
- (B) 3, 3
- (C) 4, 3
- (D) 4, 4

28. A DC Chopper is a static device that converts fixed _____ input voltage to a variable _____ output voltage.

- (A) DC, AC
- (B) AC, DC
- (C) AC, AC
- (D) DC, DC

29. A single phase full bridge inverter can operate in load commutation mode in case load consists of :

- (A) RL
- (B) RLC under damped
- (C) RLC over damped
- (D) RLC critically damped

30. A single phase full bridge diode rectifier delivers a constant load current of 10A. Average and rms values of source current are respectively :

- (A) 5A, 10A
- (B) 10A, 10A
- (C) 5A, 5A
- (D) 0A, 10A

31. In DC Choppers, per unit ripple is maximum when duty cycle α is :
- (A) 0.2
(B) 0.5
(C) 0.7
(D) 0.9
32. In single pulse modulation of PWM inverters, third harmonic can be eliminated if pulse width is equal to _____ degrees.
- (A) 30
(B) 60
(C) 120
(D) 150
33. A 200V DC machine has an armature resistance of 1Ω . If the full load current is 20A, the difference in the induced voltages, when the machine is running as motor and generator, is :
- (A) 20 V
(B) Zero
(C) 40 V
(D) 50 V
34. If the speed of a DC motor increases with load torque, then it is a :
- (A) Series motor
(B) Permanent magnet motor
(C) Differentially compound motor
(D) Cumulatively compound motor
35. A 3-phase induction motor is operating at slip S . If its two supply leads are interchanged, then its slip at that instant will be :
- (A) $2 - S$
(B) $2 + S$
(C) $1 + S$
(D) $1 - S$
36. Which one of the following capacitors starts split phase induction motor having high value of capacitance ?
- (A) 94 W, 3450 rpm
(B) 187 W, 1725 rpm
(C) 560 W, 1140 rpm
(D) 373 W, 1000 rpm
37. The starting current and torque of a 3-phase induction motor on direct-online starting is 30 A and 300 Nm respectively. What are the corresponding values with star-delta starter ?
- (A) 10 A, 100 NM
(B) 30 A, 300 NM
(C) 17.32 A, 173.2 NM
(D) 30 A, 173.3 NM

38. When two alternators are operating in parallel and at perfect synchronization, their synchronizing power is :
- Negative
 - Positive
 - Maximum positive
 - Zero
39. A 3-phase synchronous machine is synchronized with an infinite bus. Now steam input to synchronous machine is increased. With this, synchronous machine starts working as :
- Alternator at leading p. f.
 - Alternator at lagging p. f.
 - Synchronous motor at leading p. f.
 - Induction generator at lagging p. f.
40. A 480V, 60 Hz 4-pole synchronous motor is drawing 50A of current at full load and unity p. f. Assume that the motor is lossless. The output torque of the motor equals to :
- 220.7 NM
 - 160.5 NM
 - 23.11 NM
 - 282.1 NM
41. A 6-pole, 50 Hz, 3-phase synch. motor and an 8-pole, 50 Hz, 3-phase slip ring induction motor are mechanically coupled and operate on the same 3-phase, 50 Hz supply system. If they are left open circuited, then the frequency of the voltage produced across any two slip rings would be :
- 12.5 Hz
 - 25.0 Hz
 - 37.5 Hz
 - 50.0 Hz
42. For maximum current during 'Slip Test' on a synchronous machine, the armature mmf aligns along :
- d-axis
 - q-axis
 - 45° to d-axis
 - 45° to q-axis
43. A 3-phase to 3-phase cyclo-converter requires :
- 18 SCRS for 3-pulse device
 - 18 SCRS for 6-pulse device
 - 36 SCRS for 3-pulse device
 - 52 SCRS for 6-pulse device

44. The ratio of starting torque to running torque in a synchronous motor is :

- (A) Zero
- (B) One
- (C) Two
- (D) Infinity

45. A 3-phase synchronous motor will have :

- (A) No slip rings
- (B) One slip ring
- (C) Two slip rings
- (D) Three slip rings

46. Which interrupt has the highest priority ?

- (A) INTR
- (B) TRAP
- (C) RST 6.5
- (D) TRSP

47. Name the 16 bit registers in 8085 :

- (A) Stack pointer
- (B) Program counter
- (C) Both (A) and (B)
- (D) None of the above

48. Which of the following is hardware interrupts ?

- (A) RST 5.5, RST 6.5, RST 7.5
- (B) INTR, TRAP
- (C) Both (A) and (B)
- (D) RST 5.5

49. What is the RST for the TRAP ?

- (A) RST 5.5
- (B) RST 4.5
- (C) RST 4
- (D) RST 7.5

50. What are level Triggering Interrupts ?

- (A) INTR and TRAP
- (B) RST 6.5 and RST 5.5
- (C) RST 7.5 and RST 6.5
- (D) RST 4 and RST 7.5

51. Which interrupt is not level sensitive in 8085 ?

- (A) RST 6.5 is a raising edge-triggering interrupt
- (B) RST 7.5 is a raising edge-triggering interrupt
- (C) Both (A) and (B)
- (D) RST 4 is a raising edge-triggering interrupt

52. In 8086 microprocessor the following has the highest priority among all types of interrupts :
- NMI
 - DIV 0
 - TYPE 255
 - OVER FLOW
53. In 8086 microprocessor one of the following statements is not true :
- Coprocessor is interfaced in MAX mode
 - Coprocessor is interfaced in MIN mode
 - I/O can be interfaced in MAX/MIN mode
 - Supports pipelining
54. 8088 microprocessor differs from 8086 microprocessor in :
- Data width on the output
 - Address capability
 - Support of coprocessor
 - Support of MAX/MIN mode
55. Address line for TRAP is :
- 0023 H
 - 0024 H
 - 0033 H
 - 0034 H
56. When an 8086 executes an INT type instruction, it :
- Resets both IF and TF flags
 - Reset all flags
 - Set both IF and TF
 - Resets the IF and TF
57. What will be the contents of register AL after the following has been executed?
- ```
MOV BL, 8C
MOV AL, 7E
ADD AL, BL
```
- 0A and carry flag is set
  - 0A and carry flag is reset
  - 6A and carry flag is set
  - 6A and carry flag is reset
58. Direction flag is used with :
- String instructions
  - Stack instructions
  - Arithmetic instructions
  - Branch instructions
59. 8251 is a :
- UART
  - USART
  - Programmable interrupt controller
  - Programmable interval timer/counter

60. Which type of JMP instruction assembles if the distance is 0020 H bytes ?
- (A) Near  
(B) Far  
(C) Short  
(D) None of the above
61. A germanium diode has a saturation current of  $10^{-8}$  A. Calculate the junction current for a forward bias of 0.4V and 300K temperature :
- (A) 20mA  
(B) 100mA  
(C) 80mA  
(D) 48mA
62. The amount of feedback applied to an amplifier reduces the gain by a factor of 10. The band width :
- (A) Decreases by a factor of 10  
(B) Increases by a factor of 10  
(C) Remains the same  
(D) None of the above
63. The primary advantage of crystal oscillation is that :
- (A) It can oscillate to any frequency  
(B) It gives high output voltage  
(C) The frequency of oscillation remains almost constant  
(D) It operates on a very low DC supply voltage
64. The number 43 in 2's complement representation is :
- (A) 01010101  
(B) 11010101  
(C) 00101011  
(D) 10101011
65. A 12 bit ADC is operating with 1 $\mu$ sec clock period and total conversion time is seen to be 14 micro seconds. The ADC must be of :
- (A) Flash type  
(B) Counting type  
(C) Integrating type  
(D) Successive approximation type
66. Function of Zener diode is to provide \_\_\_\_\_ to galvanometer circuit.
- (A) Constant voltage  
(B) Constant current  
(C) Variable voltage  
(D) Variable current

67. In a class A amplifier,  $V_{CE(\text{Max})} = 15\text{V}$  and  $V_{CE(\text{Min})} = 1\text{V}$ . The conversion efficiency for a series fed load will be equal to :
- (A) 25%  
 (B) 23.33%  
 (C) 12.5%  
 (D) 11.67%
68. A signal may have frequency components which lie in the range of 0.001 Hz to 10 Hz. Which one of the following types of couplings should be chosen in a multistage amplifier designed to amplify the signal ?
- (A) R-C coupling  
 (B) Transformer coupling  
 (C) Direct coupling  
 (D) Double tuned transformer coupling
69. A tuned amplifier has peak output at 2 MHz and quality factor 50. The band width and 3dB frequencies shall be at what values respectively ?
- (A) 40 KHz, 2.02 MHz, 1.98 MHz  
 (B) 40 KHz, 2.04 MHz, 1.96 MHz  
 (C) 80 KHz, 2.04 MHz, 1.96 MHz  
 (D) 80 KHz, 2.08 MHz, 1.92 MHz
70. The Octal equivalent of the HEX number AB.CD is :
- (A) 253.314  
 (B) 253.632  
 (C) 526.314  
 (D) 526.632
71. Which of the following subtractions results in  $F_{16}$  ?
1.  $(BA)_{16} - (AB)_{16}$
  2.  $(BC)_{16} - (CB)_{16}$
  3.  $(CB)_{16} - (BC)_{16}$
- (A) Only 1 and 2  
 (B) Only 1 and 3  
 (C) Only 2 and 3  
 (D) 1, 2 and 3
72. The NAND-NAND realization is equal to :
- (A) AND-NOT realization  
 (B) AND-OR realization  
 (C) OR-AND realization  
 (D) NOT-OR realization

73. An AND gate :
- (A) Implements logic addition
  - (B) Gives high output only when all inputs are low
  - (C) Is equivalent to a series switching circuit
  - (D) Is equivalent to a parallel switching circuit
74. The voltage levels for a negative logic system :
- (A) Must necessarily be negative
  - (B) Could be negative or positive
  - (C) Must necessarily be positive
  - (D) Must necessarily be either zero or  $-5V$
75. For coherent detection of digital signals, the receiver must be :
- (A) Synchronized in time only
  - (B) Synchronized in phase only
  - (C) Synchronized in time and phase
  - (D) Unsynchronized
76. Modulation index is :
- (A)  $V_m / V_c$
  - (B)  $V_c / V_m$
  - (C)  $V_m / I_c$
  - (D) None of the above
77.  $f_c + f_m$  is :
- (A) Upper band frequency
  - (B) Lower band frequency
  - (C) Mid band frequency
  - (D) None of the above
78. In amplitude modulation, frequency is :
- (A) Constant
  - (B) Zero
  - (C) Variable
  - (D) One
79. In frequency modulation, frequency is :
- (A) Constant
  - (B) Zero
  - (C) Variable
  - (D) One
80. In Frequency modulation has :
- (A) One carrier
  - (B) One carrier with two side band frequencies
  - (C) One carrier with infinite frequencies
  - (D) None of the above

81. Amplitude modulation has :
- (A) One carrier
  - (B) One carrier with two side band frequencies
  - (C) One carrier with infinite frequencies
  - (D) None of the above
82. FM signal is less affected by :
- (A) Loss
  - (B) Temperature
  - (C) Frequency
  - (D) Noise
83. In order to reduce interference, the signal should be :
- (A) Amplified
  - (B) Multiplied
  - (C) Demodulated
  - (D) Modulated
84. An example for an analog signal is :
- (A) Sine wave
  - (B) Impulse signal
  - (C) Sample signal
  - (D) None of the above
85. Messages travel from transmitter to receiver with help of :
- (A) Transmitter
  - (B) Receiver
  - (C) Channel
  - (D) Antennas
86. Bandwidth of FM signal is \_\_\_\_\_ than AM signal.
- (A) lesser
  - (B) either lesser or larger
  - (C) larger
  - (D) None of the above
87. In AM modulation, when the modulation index increases, transmitted power is :
- (A) Constant
  - (B) Increased
  - (C) Decreased
  - (D) None of the above
88. In FM modulation, when the modulation index increases, transmitted power is :
- (A) Constant
  - (B) Increased
  - (C) Decreased
  - (D) None of the above

89. Sound signals in TV are :

- (A) Amplitude modulated
- (B) dc modulated
- (C) Frequency modulated
- (D) Both (A) and (C)

90. Video signals in TV are :

- (A) Amplitude modulated
- (B) dc modulated
- (C) Frequency modulated
- (D) None of the above



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