ENGINEERING SERVICES
EXAMINATION-2016

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T.B.C. : B-HUF-P-GEB

Test Booklet Series

Serial No.

0056941

TEST BOOKLET

ELECTRICAL ENGINEERING

Paper II

A

Time Allowed : Two Hours

Maximum Marks : 200

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1. Compared to the salient-pole Hydro-electric generators, the steam and the gas-turbine generators have cylindrical rotors for

   (a) Better air-circulation in the machine

   (b) Reducing the eddy-current losses in the rotor

   (c) Accommodating larger number of terms in the field winding

   (d) Providing higher mechanical strength against the centrifugal stress

2. Consider the following losses for short circuit test on a transformer :

   1. Copper loss
   2. Copper and iron losses
   3. Eddy current and hysteresis losses
   4. Friction and windage losses

   Which of the above is/are correct ?

   (a) 1 only

   (b) 2 only

   (c) 3 only

   (d) 2, 3 and 4

3. A 2000 V/200 V, 20 kVA, two winding, single phase transformer is reconnected as a step up auto-transformer having 200 V/2200 V ratings. Then the power rating for the auto transformer will be

   (a) 160 kVA

   (b) 180 kVA

   (c) 200 kVA

   (d) 220 kVA

4. The regulation of a transformer in which ohmic loss is 1% of the output and reactance drop is 5% of the voltage, when operating at 0·8 power factor lagging, is

   (a) 3·8%

   (b) 4·8%

   (c) 5·2%

   (d) 5·8%

5. In a power transformer, the core loss is 50 W at 40 Hz, and 100 W at 60 Hz, under the condition of same maximum flux density in both cases. The core loss at 50 Hz will be

   (a) 64 W

   (b) 73 W

   (c) 82 W

   (d) 91 W

6. Consider the following advantages of a distributed winding in a rotating machine :

   1. Better utilization of core as a number of evenly placed small slots are used
   2. Improved waveform as harmonic emf's are reduced
   3. Diminished armature reaction and efficient cooling

   Which of the above advantages are correct ?

   (a) 1 and 2 only

   (b) 1 and 3 only

   (c) 2 and 3 only

   (d) 1, 2 and 3

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7. The breadth factor for 3rd harmonic emf of a 3-phase, 4-pole, synchronous machine having 36 stator slots is

(a) 0·47

(b) 0·53

(c) 0·67

(d) 0·73

8. Consider the following factors for a dc machine :

1. Interpole

2. Armature resistance

3. Reduction in field current

Which of the above factors are responsible for decrease in terminal voltage of a shunt generator ?

(a) 1 and 2 only

(b) 2 and 3 only

(c) 1 and 3 only

(d) 1, 2 and 3

9. A dc motor develops an electromagnetic torque of 150 N-m in a certain operating condition. From this operating condition, a 10% reduction in field flux and 50% increase in armature current is made. What will be new value of electro-magnetic torque ?

(a) 225 N-m

(b) 202·5 N-m

(c) 22·5 N-m

(d) 20·25 N-m

10. A dc machine, having a symmetrical closed-circuit armature winding and a sinusoidal air-gap flux-density distribution, will have a sinusoidal voltage induced in the individual coils. The resultant brush-to-brush voltage will have a waveform

(a) Sinusoidal with the negative-half reversed

(b) Unidirectional and constant without any ripples

(c) Unidirectional and constant with ripples superimposed

(d) Sinusoidal positive-half and zero negative-half, in each cycle

11. A 3-phase, induction motor operating at a slip of 5% develops 20 kW rotor power output. What is the corresponding rotor copper loss in this operating condition ?

(a) 750 W

(b) 900 W

(c) 1050 W

(d) 1200 W

12. What are the signs of load angle in an alternator during generator and motor operations, respectively ?

(a) Negative, negative

(b) Positive, negative

(c) Negative, positive

(d) Positive, positive

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13. In an alternator, the armature winding is kept stationary while the field winding is kept rotating for the following reasons :

1. Armature handles very large current and high voltage
2. Armature fabrication, involving deep slots to accommodate large coils, is easy if armature is kept stationary
3. It is easier to cool the stator than the rotor

Which of the above reasons are correct ?

(a) 1 and 2 only

(b) 1 and 3 only

(c) 2 and 3 only

(d) 1, 2 and 3

14. Increasing the air-gap of a squirrel-cage induction motor would result in

(a) Increase in no-load speed

(b) Increase in full-load power-factor

(c) Increase in magnetizing current

(d) Maximum available torque

15. A cumulative compound d.c. motor runs at 1500 rpm on full load. If its series field is short circuited, its speed

(a) Becomes zero

(b) Remains same

(c) Increases

(d) Decreases

16. If the capacitor of a capacitor-start single-phase motor fails to open when the motor picks up speed,

(a) The motor will stop

(b) The auxiliary winding will be damaged

(c) The capacitor will be damaged

(d) The winding will be damaged

17. For a 3-phase induction motor, what fraction/multiple of supply voltage is required for a direct-on-line starting method such that starting current is limited to 5 times the full-load current and motor develops 1·5 times full-load torque at starting time ?

(a) 1·632

(b) 1·226

(c) 0·816

(d) 0·456

18. What is the material of slip-rings in an induction machine ?

(a) Carbon

(b) Nickel

(c) Phosphor bronze

(d) Manganese

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19. The stator loss of a 3-phase induction motor is 2 kW. If the motor is running with a slip of 4% and power input of 90 kW, then what is the rotor mechanical power developed ?

(a) 84·48 kW

(b) 86·35 kW

(c) 89·72 kW

(d) 90·52 kW

20. In a single-phase capacitor-start induction motor, the direction of rotation

(a) can be changed by reversing the main winding terminals

(b) cannot be changed

(c) is dependent on the size of the capacitor

(d) can be changed only in large capacity motors

21. Air pollution due to smoke around a thermal power station can be reduced by installing

(a) Induced draft fan

(b) Super heater

(c) Economizer

(d) Electrostatic precipitator

22. The load curve is useful in deciding

1. The operating schedule of generating units
2. The total installed capacity

Which of the above statements is/are correct ?

(a) 1 only

(b) 2 only

(c) Both 1 and 2

(d) Neither 1 nor 2

23. The maximum demand on a steam power station is 480 MW. If the annual load factor is 40%, then the total energy generated annually is

(a) $19819{\cdot}2 \times 10^5$ kWh

(b) $18819{\cdot}2 \times 10^5$ kWh

(c) $17819{\cdot}2 \times 10^5$ kWh

(d) $16819{\cdot}2 \times 10^5$ kWh

24. To equalize the sending and receiving end voltages, impedance is connected at the receiving end of a transmission line having the following *ABCD* parameters

$A = D = 0{\cdot}9 \angle 0° \quad B = 200 \angle 90° \ \Omega$

The impedance so connected would be

(a) $1000 \angle 0° \ \Omega$

(b) $1000 \angle 90° \ \Omega$

(c) $2000 \angle 90° \ \Omega$

(d) $2000 \angle 0° \ \Omega$

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25. The maximum efficiency in the transmission of bulk ac power will be achieved when the power factor of the load is

(a) Slightly less than unity lagging

(b) Slightly less than unity leading

(c) Unity

(d) Considerably less than unity

26. A speed of a d.c. motor is

(a) Directly proportional to back emf and inversely proportional to flux

(b) Inversely proportional to back emf and directly proportional to flux

(c) Directly proportional to back emf as well as to flux

(d) Inversely proportional to back emf as well as to flux

27. When the sending end voltage and current are numerically equal to the receiving end voltage and current respectively, then the line is called

(a) A tuned line

(b) A transposed line

(c) A long line

(d) A short line

28. If V_m is the peak value of an applied voltage in a half wave rectifier with a large capacitor across the load, then the peak inverse voltage will be

(a) 0·5 V_m

(b) V_m

(c) 1·5 V_m

(d) 2·0 V_m

29. A 100 MVA generator operates on full-load of 50 Hz frequency. The load is suddenly reduced to 50 MW. The steam valve begins to close only after 0·4 s and if the value of the inertia constant H is 5 s, then the frequency at 0·4 s is nearly

(a) 38 Hz

(b) 44 Hz

(c) 51 Hz

(d) 62 Hz

30. A 25 MVA, 33 kV transformer has a *pu* impedance of 0·9. The *pu* impedance at a new base 50 MVA at 11 kV would be

(a) 10·4

(b) 12·2

(c) 14·4

(d) 16·2

31. Symmetrical components are used in power system for the analysis of

(a) Balanced 3-phase fault

(b) Unbalanced 3-phase fault

(c) Normal power system under steady conditions

(d) Stability of system under disturbance

32. For V-curves for a synchronous motor the graph is drawn between

(a) Terminal voltage and load factor

(b) Power factor and field current

(c) Field current and armature current

(d) Armature current and power factor

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33. Critical clearing angle is related to

(a) Stability study of power system

(b) Power flow study of power system

(c) Regulation of transmission line

(d) Power factor improvement of the system

34. A 2-pole, 50 Hz, 11 kV, 100 MW alternator has a moment of inertia of 10,000 kg.m^2. The value of inertia constant, H is

(a) 3·9 s

(b) 4·3 s

(c) 4·6 s

(d) 4·9 s

35. Stability of a power system can be improved by

1. Using series compensators
2. Using parallel transmission lines
3. Reducing voltage of transmission

Which of the above statements are correct ?

(a) 1 only

(b) 2 only

(c) 2 and 3

(d) 1 and 2

36. Equal-Area Criterion is employed to determine

(a) The steady state stability

(b) The transient stability

(c) The reactive power limit

(d) The rating of a circuit breaker

37. Consider the following advantages with respect to HVDC transmission :

1. Long distance transmission
2. Low cost of transmission
3. Higher efficiency

Which of the above advantages are correct ?

(a) 1 and 2 only

(b) 1 and 3 only

(c) 2 and 3 only

(d) 1, 2 and 3

38. The three sequence voltages at the point of fault in a power system are found to be equal. The nature of the fault is

(a) L – G

(b) L – L – L

(c) L – L

(d) L – L – G

39. A distance relay with inherent directional property is known as

(a) Buchholtz relay

(b) Admittance relay

(c) Directional over current relay

(d) Directional switched relay

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40. Consider the following circuit breakers for 220 kV substations :

1. Air
2. SF_6
3. Vacuum

Which of the above circuit breakers can be used in an indoor substation ?

(a) 1, 2 and 3

(b) 1 only

(c) 2 only

(d) 3 only

41. A semiconductor differs from a conductor in that it has

(a) Only one path for the free electrons in the valence band

(b) Only one path for holes in the conduction band

(c) Two paths followed by free electrons and holes, one an ordinary path in the conduction band and the other one an extraordinary path in the valence band, respectively

(d) Two paths followed by free electrons and holes, one an extraordinary path in the conduction band and the other one an ordinary path in valence band, respectively

42. Which of the following circuits is used for converting a sine wave into a square wave ?

(a) Monostable multivibrator

(b) Bistable multivibrator

(c) Schmitt trigger circuit

(d) Darlington complementary pair

43. What is the type of breakdown that occurs in a Zener diode having breakdown voltage (bV) ?

(a) Avalanche breakdown only

(b) Zener breakdown only

(c) Avalanche breakdown where breakdown voltage is below 6 V and Zener breakdown otherwise

(d) Zener breakdown where breakdown voltage is below 6 V and Avalanche breakdown otherwise

44. Consider the following statements :

A power supply uses bridge rectifier with a capacitor input filter. If one of the diodes is defective, then

1. The dc load voltage will be lower than its expected value
2. Ripple frequency will be lower than its expected value
3. The surge current will increase considerably

Which of the above statements are correct ?

(a) 1 and 2 only

(b) 1 and 3 only

(c) 2 and 3 only

(d) 1, 2 and 3

45. The lowest frequency of ac components in the outputs of half-wave and full-wave rectifiers are, respectively, (where ω is the input frequency)

(a) $0{\cdot}5\omega$ and ω

(b) ω and 2ω

(c) 2ω and ω

(d) ω and 3ω

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46. A half-wave rectifier circuit using ideal diode has an input voltage of 20 sin ωt Volt. Then average and rms values of output voltage respectively, are

(a) $\frac{10}{\pi}$ V and 5 V

(b) $\frac{20}{\pi}$ V and 10 V

(c) $\frac{20}{\pi}$ V and 5 V

(d) $\frac{10}{\pi}$ V and 10 V

47. For a *BJT*, $I_C = 5$ mA, $I_B = 50$ μA and $I_{CBO} = 0{\cdot}5$ μA, then the value of β is

(a) 99

(b) 91

(c) 79

(d) 61

48. Which of the following conditions must be satisfied for a transistor to be in saturation ?

1. Its collector to base junction should be under forward bias
2. Its collector to base junction should be under reverse bias
3. Its emitter to base junction should be under reverse bias
4. Its emitter to base junction should be under forward bias

Which of the above conditions are correct ?

(a) 1 and 3

(b) 2 and 3

(c) 2 and 4

(d) 1 and 4

49. In an amplifier with a gain of 1000 without feedback and cut-off frequencies at 2 kHz and 20 kHz, negative feedback of 1% is employed. The cut-off frequencies with feedback would be

(a) 220 Hz and 22 kHz

(b) 182 Hz and 220 kHz

(c) 220 kHz and 220 kHz

(d) 182 Hz and 22 kHz

50. Consider the following circuits :

1. Oscillator
2. Emitter follower
3. Power amplifier

Which of the above circuits employ feedback ?

(a) 1 and 2 only

(b) 2 and 3 only

(c) 1 and 3 only

(d) 1, 2 and 3

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51. Three identical amplifiers each having a voltage gain of 50 are cascaded. The open loop voltage gain of the combined amplifier is

(a) 71 dB

(b) 82 dB

(c) 91 dB

(d) 102 dB

52. A clamper circuit

1. Adds or subtracts a dc voltage to or from a waveform
2. Does not change the shape of the waveform

Which of the above statements is/are correct ?

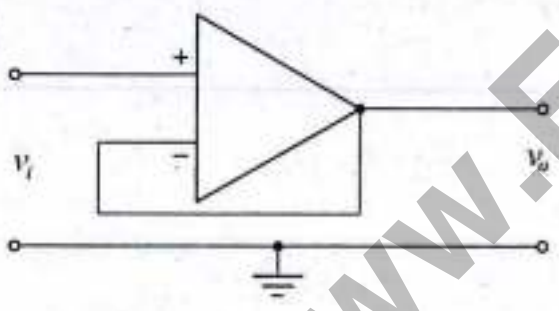
(a) 1 only

(b) 2 only

(c) Both 1 and 2

(d) Neither 1 nor 2

53.



The operational amplifier circuit shown in figure having a voltage gain of unity has

(a) High input impedance and high output impedance

(b) High input impedance and low output impedance

(c) Low input impedance and low output impedance

(d) Low input impedance and high output impedance

54. Consider the following statements :

1. Race-around condition occurs in a JK flip-flop when the inputs are 1, 1
2. A flip-flop is used to store one bit of information
3. A transparent latch consists of D-type flip-flops
4. Master-slave configuration is used in a flip-flop to store two bits of information

Which of the above statements are correct ?

(a) 1, 2 and 3 only

(b) 1, 2 and 4 only

(c) 3 and 4 only

(d) 1, 2, 3 and 4

55. An operational amplifier has a slew rate of 2 V/μ sec. If the peak output is 12 V, what will be the power bandwidth ?

(a) 36·5 kHz

(b) 26·5 kHz

(c) 22·5 kHz

(d) 12·5 kHz

56. A voltage follower is used as

1. An isolation amplifier
2. A buffer amplifier

Which of the above statements is/are correct ?

(a) 1 only

(b) 2 only

(c) Both 1 and 2

(d) Neither 1 nor 2

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57. If a, b, c are 3-input variables, then Boolean function $y = ab + bc + ca$ represents

1. A 3-input majority gate
2. A 3-input minority gate
3. Carry output of a full adder
4. Product circuit for a, b and c

Which of the above statements are correct ?

(a) 2 and 3

(b) 2 and 4

(c) 1 and 3

(d) 1 and 4

58. In a 2-input CMOS logic gate, one input is left floating i.e. connected neither to ground nor to a signal. What will be the state of that input ?

(a) 1

(b) 0

(c) Same as that of the other input

(d) Indeterminate (neither 1 nor 0)

59. The expression for MOD number for a ripple counter with N flip-flops is

(a) N

(b) 2^N

(c) 2^{N-1}

(d) $2^N - 1$

60. Why a ROM does not have data inputs ?

(a) It does not have a WRITE operation

(b) Data inputs are integrated with data outputs

(c) Data inputs are integrated with address inputs

(d) ROM is sequentially accessed

61. Consider the following statements :

1. RAM is a non-volatile memory whereas ROM is a volatile memory
2. RAM is a volatile memory whereas ROM is a non-volatile memory
3. Both RAM and ROM are volatile memories but in ROM data is not when power is switched off

Which of the above statements are correct ?

(a) 1 only

(b) 2 only

(c) 3 only

(d) None of the above

62. Consider the following instructions :

1. LOCK
2. STD
3. HLT
4. CLI

Which of the above are machine control instructions ?

(a) 1 and 4

(b) 1 and 3

(c) 2 and 3

(d) 2 and 4

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63. What is the assembler directive statement used to reserve an array of 100 words in memory and initialize all 100 words with 0000 and give it a name STORAGE ?

(a) STORAGE DW 100

(b) STORAGE DW 100 DUP (0)

(c) STORAGE DW 100 DUP (?)

(d) STORAGE DB 100

64. Consider the following statements :

1. Auxiliary carry flag is used only by the DAA and DAS instructions
2. Zero flag is set to 1 if the two operands compared are equal
3. All conditional jumps are long-type jumps

Which of the above statements are correct ?

(a) 1, 2 and 3

(b) 1 and 2 only

(c) 1 and 3 only

(d) 2 and 3 only

65. If a 3-phase slip ring induction motor is fed from the rotor side with stator winding short circuited, then frequency of currents flowing in the short circuited stator is

(a) Slip × frequency

(b) Supply frequency

(c) Frequency corresponding to rotor speed

(d) Zero

66. The reversing of a 3ϕ induction motor is achieved by

(a) $Y - \Delta$ starter

(b) DOL starter

(c) Auto transformer

(d) Interchanging any two of the supply line

67. Consider the following interrupts for 8085 microprocessor :

1. INTR
2. RST 5·5
3. RST 6·5
4. RST 7·5
5. TRAP

If the interrupt is to be vectored to any memory location then which of the above interrupts is/are correct ?

(a) 1 and 2 only

(b) 1, 2, 3 and 4

(c) 5 only

(d) 1 only

68. The instruction *JNC* 16 bit refers to Jump to 16 bit address if

(a) Sign flag is set

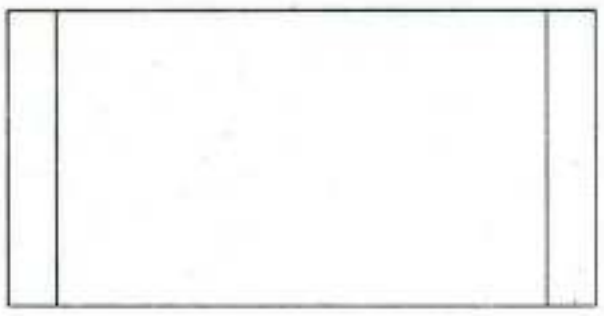
(b) CY flag is reset

(c) Zero flag is set

(d) Parity flag is reset

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69. Consider the symbol shown below :



What function does the above symbol represent in a program flow chart ?

(a) A process

(b) Decision making

(c) A subroutine

(d) Continuation

70. Which one of the following statements is correct regarding the instruction CMP A ?

(a) Compare accumulator with register A

(b) Compare accumulator with memory

(c) Compare accumulator with register H

(d) This instruction does not exist

71. The instruction RET executes with the following series of machine cycle

(a) Fetch, read, write

(b) Fetch, write, write

(c) Fetch, read, read

(d) Fetch, read

72. Consider the following circuits :

1. Full adder
2. Half adder
3. JK flip-flop
4. Counter

Which of the above circuits are classified as sequential logic circuits ?

(a) 1 and 2

(b) 3 and 4

(c) 2 and 3

(d) 1 and 4

73. When a peripheral is connected to the Microprocessor in Input Output mode, the data transfer takes place between

(a) Any register and I/O device

(b) Memory and I/O device

(c) Accumulator and I/O device

(d) HL register and I/O device

74. While execution of IN/OUT instruction takes place, the 8-bit address of the port is placed on

(a) Lower address bus

(b) Higher address bus

(c) Data bus

(d) Lower as well as higher order address bus

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75. The port *C* of 8255 can be configured to work in

(a) mode 0, mode 1, mode 2 and BSR

(b) mode 0, mode 1 and mode 2

(c) mode 2 and BSR

(d) BSR mode only

76. Consider the following statements :

1. Semiconductor memories are organized as linear array of memory locations
2. To address a memory location out of N memory locations, at least log N bits of address are required
3. 8086 can address 1,048,576 addresses
4. Memory for an 8086 is set up as two banks to make it possible to read or write a word with one machine cycle

Which of the above statements are correct ?

(a) 1, 2 and 3 only

(b) 1, 2 and 4 only

(c) 3 and 4 only

(d) 1, 2, 3 and 4

77. The sticker over the EPROM window protects the chip from

(a) Infrared light from sunlight

(b) UV light from fluorescent lights and sunlight

(c) Magnetic field

(d) Electrostatic field

78. A 2400/240 V, 200 kVA, single phase transformer has a core loss of 1·8 kW at rated voltage. Its equivalent resistance is 1·1%. Then the transfer efficiency at 0·9 power factor and on full load is

(a) 95·60%

(b) 96·71%

(c) 97·82%

(d) 98·93%

79. The 8259A Programmable Interrupt Controller in cascade mode can handle interrupts of

(a) 8 priority levels

(b) 16 priority levels

(c) 32 priority levels

(d) 64 priority levels

80. 8259A Programmable Interrupt Controller uses the following initialization commands :

1. ICW_1
2. ICW_2
3. ICW_3
4. ICW_4

If 8259A is to be used in cascaded and fully nested mode, the ICW_1 bits D_0 and D_1 are

(a) 0 and 0

(b) 1 and 0

(c) 0 and 1

(d) 1 and 1

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81. The induced emf in the armature conductor of a D.C. machine is

(a) Sinusoidal

(b) Trapezoidal

(c) Rectangular unidirectional

(d) Triangular

82. If a carrier of 100% modulated AM is suppressed before transmission, the power saving is nearly

(a) 50%

(b) 67%

(c) 100%

(d) 125%

83. An FM signal is represented by $v = 12 \sin(6 \times 10^8 t + 5 \sin 1250 t)$. The carrier frequency f_c and frequency deviation δ, respectively, are

(a) 191 MHz and 665 Hz

(b) 95·5 MHz and 995 Hz

(c) 191 MHz and 995 Hz

(d) 95·5 MHz and 665 Hz

84. When the modulating frequency is doubled the modulation index is halved and the modulating voltage remains constant. This happens when the modulating system is

(a) AM

(b) PM

(c) FM

(d) Delta Modulation

85. $v = A \sin(\omega_c t + m \sin \omega_m t)$ is the expression for

(a) Amplitude modulated signal

(b) Frequency modulated signal

(c) Phase modulated signal

(d) Carrier signal used for modulation

86. The four basic elements in a PLL are loop filter, loop amplifier, VCO and

(a) Up converter

(b) Down converter

(c) Phase detector

(d) Frequency multiplier

87. In a frequency modulated (FM) system, when the audio frequency is 500 Hz and audio frequency voltage is 2·4 V, the frequency deviation δ is 4·8 kHz. If the audio frequency voltage is now increased to 7·2 V then what is the new value of deviation ?

(a) 0·6 kHz

(b) 3·6 kHz

(c) 12·4 kHz

(d) 14·4 kHz

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88. Modulation is used to

1. Separate different transmissions
2. Reduce the bandwidth requirement
3. Allow the use of practicable antennas
4. Ensure that intelligence may be transmitted over long distances

Which of the above statements are correct ?

(a) 1, 2 and 3 only

(b) 1, 3 and 4 only

(c) 2 and 4 only

(d) 1, 2, 3 and 4

89. Carson's rule is (with symbols having their standard meaning)

(a) $B = 2\,DW$

(b) $B = 2\,(D + 1)\,W$

(c) $B = \sqrt{2}\,(D + 1)\,W$

(d) $B = \sqrt{2}\,DW$

90. Consider the following features of FM vis-a-vis AM :

1. Better noise immunity is provided
2. Lower bandwidth is required
3. The transmitted power is better utilized
4. Less modulating power is required

Which of the above are advantages of FM over AM ?

(a) 1, 2 and 3 only

(b) 1, 3 and 4 only

(c) 2 and 4 only

(d) 1, 2, 3 and 4

91. The ideal characteristic of a stabilizer is

(a) Constant output voltage with low internal resistance

(b) Constant output current with low internal resistance

(c) Constant output voltage with high internal resistance

(d) Constant internal resistance with variable output voltage

92. For a d.c. shunt generator to self excite, the conditions to be satisfied are that there must be some residual magnetism in the field magnet, it must be in the proper direction and the shunt field resistant must be

(a) Above the critical field resistance

(b) Equal to the critical field resistance

(c) Less than the armature resistance

(d) Less than the critical field resistance

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93. In an IGBT cell the collector and emitter are respectively

(a) n and p

(b) n^+ and p^+

(c) p and n

(d) p^+ and n^+

94. The main units in a pulse code modulator are :

1. Sampler
2. Quantiser
3. Encoder
4. Comparator

(a) 1 and 2 only

(b) 2 and 3 only

(c) 1, 2 and 3

(d) 2 and 4 only

95. The reverse recovery time of a diode is 3 μs and rate of fall $\left(\frac{di}{dt}\right)$ is 30 $A/\mu s$. The stored charge of the diode is

(a) 45 μC

(b) 135 μC

(c) 270 μC

(d) 540 μC

96. NAND and NOR gates are called 'Universal' gates primarily because

(a) They are available everywhere

(b) They are widely used in I.C. packages

(c) They can be combined to produce AND, OR and NOR gate

(d) They can be manufactured easily

97. If a medium transmission line is represented by nominal T, the value of B of $ABCD$ constant is

(a) Z

(b) $Y\left(1+\frac{1}{4}YZ\right)$

(c) $Z\left(1+\frac{1}{4}YZ\right)$

(d) $\left(1+\frac{1}{2}YZ\right)$

98. To turn-off a GTO what is required at the gate ?

(a) A high amplitude (but low energy) negative current

(b) A low amplitude negative current

(c) A high amplitude negative voltage

(d) A low amplitude negative voltage

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99. A chopper circuit is operating on TRC control mode at a frequency of 2 kHz on a 230 V dc supply. For output voltage of 170 V, the conduction and blocking periods of a thyristor in each cycle are respectively

(a) 0·386 ms and 0·114 ms

(b) 0·369 ms and 0·131 ms

(c) 0·390 ms and 0·110 ms

(d) 0·131 ms and 0·369 ms

100. A switched-capacitor network is/are

1. Time variant sample data network
2. Non linear network
3. Linear time invariant network

(a) 1 only

(b) 2 only

(c) 3 only

(d) 1 and 2

101. A transformer may have negative voltage regulation if the load power factor (p.f.) is

(a) Leading for some values of p.f.

(b) Unity p.f.

(c) Lagging but not zero p.f.

(d) Only zero p.f. lag

102. Current source inverters are suitable for supplying power to

(a) R-L loads

(b) Inductive loads

(c) All loads

(d) Capacitive loads

103. The main application of multilevel inverter is in

(a) Reactive power compensation

(b) D.C. motor drive

(c) Synchronous Buck-converter

(d) Voltage regulator

104. In a 3-phase inverter with 180° conduction mode the number of switches that is on at any instant of time is

(a) 1

(b) 2

(c) 3

(d) 4

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105. In the sinusoidal pulse-width modulation scheme, if the zero of the triangular wave coincides with the zero of the reference sinusoidal, then the number of pulses per half cycle is

(a) $\frac{f_c}{2f}$

(b) $\frac{f_c}{2f}+1$

(c) $\frac{2f_c}{f}$

(d) $\frac{f_c}{2f}-1$

where f_c is the frequency of the carrier wave and f is the frequency of the sinusoid.

Directions :

Each of the next **Fifteen (15)** items consists of two statements, one labelled as the 'Statement (I)' and the other as 'Statement (II)'. Examine these two statements carefully and select the answers to these items using the codes given below :

Codes :

(a) Both Statement (I) and Statement (II) are individually true and Statement (II) is the correct explanation of Statement (I)

(b) Both Statement (I) and Statement (II) are individually true but Statement (II) is ***not*** the correct explanation of Statement (I)

(c) Statement (I) is true but Statement (II) is false

(d) Statement (I) is false but Statement (II) is true

106. Statement (I) : The armature structures of all rotating machines are laminated in order to reduce the eddy-current losses.

Statement (II) : The armature windings of both the D.C. and A.C. machines have to deal with alternating currents only.

107. Statement (I) : The electro-mechanical energy conversion principles are developed with the 'field energy', being magnetic or electric, as the basis.

Statement (II) : This approach can deal with only the steady-state analysis of the electro-mechanical energy conversion, but not the transient-state analysis.

108. Statement (I) : A Direct-On-Line (DOL) starter for starting dc motor is used for reasons of economy.

Statement (II) : DOL starter limits the starting current to a safe limit.

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109. Statement (I) : For constant applied voltage to its terminals, the effect of armature resistance in the operation of a dc shunt motor, is to reduce the operating speed, and cause a 'drooping' speed Vs. load characteristic.

Statement (II) : The effect of armature demagnetization with the decreasing load is to reduce the drop in operating speed, and can be designed to give a 'rising' speed Vs. load characteristic which may result in a possible 'runaway'.

110. Statement (I) : Synchronous motor is a constant speed motor.

Statement (II) : Synchronous motor is not a self-starting motor.

111. Statement (I) : A synchronous motor can be used as an active device to improve the power factor of a power system.

Statement (II) : By over-excitation the synchronous machine would operate as a capacitor.

112. Statement (I) : Stability of a power system can be improved by using parallel transmission lines.

Statement (II) : Two transmission lines in parallel will increase the impedance between sending end and receiving end compared to single line.

113. Statement (I) : When all inputs of a NAND gate are shorted to get a single input, single output gate, it becomes an inverter.

Statement (II) : When all inputs of a NAND gate are at logic '0' level, the output is at logic '0' level.

114. Statement (I) : XOR gate is not a universal gate.

Statement (II) : It is not possible to realize all Boolean functions using XOR gates only.

115. Statement (I) : READY is an output signal used to synchronize slower peripheral.

Statement (II) : HOLD is activated by an external signal.

116. Statement (I) : The direct memory access or DMA mode of data transfer is the fastest among all the modes of data transfer.

Statement (II) : In DMA mode the device directly transfers data to/from memory without interference from CPU.

117. Statement (I) : Modulation index of AM is always kept less than 1.

Statement (II) : Modulation index for FM may be greater than 1.

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118. Statement (I) : The main function of a freewheeling diode in Rectifier circuits is to prevent the reversal of load voltage.

Statement (II) : The freewheeling diode is never connected across the load.

119. Statement (I) : In sinusoidal pulse width modulation, width of each pulse is varied in proportion to amplitude of a sine-wave evaluated at the centre of the same pulse.

Statement (II) : The rms value of output voltage can be varied by varying the modulation index.

120. Statement (I) : Equal-area criterion can be used to determine the stability of single machine infinite bus system.

Statement (II) : An infinite bus system has infinite inertia and constant voltage.

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