Download From: http://iasexamportal.com

...GINEERING SERVICES
E... MINATION 2015

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

T.B.C. : B-GTD-O-FDB

Test Booklet Series

Serial No.	

TEST BOOKLET

ELECTRICAL ENGINEERING

Paper II

A

Time Allowed : Two Hours

Maximum Marks : 200

INSTRUCTIONS

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.
2. **PLEASE NOTE THAT IT IS THE CANDIDATE'S RESPONSIBILITY TO ENCODE AND FILL IN THE ROLL NUMBER AND TEST BOOKLET SERIES CODE A, B, C OR D CAREFULLY AND WITHOUT ANY OMISSION OR DISCREPANCY AT THE APPROPRIATE PLACES IN THE *OMR* ANSWER SHEET. ANY OMISSION/DISCREPANCY WILL RENDER THE ANSWER SHEET LIABLE FOR REJECTION.**
3. You have to enter your Roll Number on the Test Booklet in the Box provided alongside. ***DO NOT*** write ***anything else*** on the Test Booklet.
4. This Test Booklet contains **120** items (questions). Each item comprises four responses (answers). You will select the response which you want to mark on the Answer Sheet. In case, you feel that there is more than one correct response, mark the response which you consider the best. In any case, choose **ONLY ONE** response for each item.
5. You have to mark your responses **ONLY** on the separate Answer Sheet provided. See directions in the Answer Sheet.
6. All items carry equal marks.
7. Before you proceed to mark in the Answer Sheet the response to various items in the Test Booklet, you have to fill in some particulars in the Answer Sheet as per instructions sent to you with your Admission Certificate.
8. After you have completed filling in all your responses on the Answer Sheet and the examination has concluded, you should hand over to the Invigilator ***only the Answer Sheet***. You are permitted to take away with you the Test Booklet.
9. Sheets for rough work are appended in the Test Booklet at the end.
10. **Penalty for wrong Answers :**
    THERE WILL BE PENALTY FOR WRONG ANSWERS MARKED BY A CANDIDATE.
    (i) There are four alternatives for the answer to every question. For each question for which a wrong answer has been given by the candidate, **one-third (0·33)** of the marks assigned to that question will be deducted as penalty.
    (ii) If a candidate gives more than one answer, it will be treated as **wrong answer** even if one of the given answers happens to be correct and there will be same penalty as above to that question.
    (iii) If a question is left blank i.e., no answer is given by the candidate, there will be **no penalty** for that question.

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

Download From: http://iasexamportal.com

Download From: http://iasexamportal.com

1. A 2000/200 V, 50 Hz single-phase transformer has an exciting current of 0·5 A and a core-loss of 600 W. When H.V. side is energized by the rated voltage and frequency, the magnetizing current is

   (a) 0·1 A

   (b) 0·2 A

   (c) 0·3 A

   (d) 0·4 A

2. A 250 kVA, 11000 V / 400 V and 50 Hz single-phase transformer has 80 turns on the secondary, what is the maximum value of flux ?

   (a) 2475 mWb

   (b) 0·2 mWb

   (c) 22·5 mWb

   (d) 55·2 mWb

3. In a normal operation of 400 V, 50 Hz transformer, the total iron loss is 2500 W. When the supply voltage and frequency are reduced to 200 V and 25 Hz respectively, the corresponding loss is 850 W. The eddy-current loss at normal voltage and frequency is

   (a) 400 W

   (b) 800 W

   (c) 1600 W

   (d) 200 W

4. A magnetic circuit has 150 turns-coil, the cross-sectional area 5×10^{-4} m^2 and the length of the magnetic circuit 25×10^{-2} m. What are the values of magnetic field intensity and relative permeability when the current is 2 A and total flux is $0{\cdot}3\times10^{-3}$ Wb ?

   (a) 1200 AT/m and 397·9

   (b) 300 AT/m and 500×10^{-6}

   (c) 300 AT/m and 397·9

   (d) 1200 AT/m and 500×10^{-6}

5. A 240 V / 120 V, 12 kVA auto-transformer has 96·2% efficiency at full-load and unity power-factor. The full-load efficiency at 0·85 pf lagging when connected to a load across 360 V would be

   (a) 89·5%

   (b) 92·8%

   (c) 98·5%

   (d) 88·9%

6. The percentage resistance and reactance of a transformer are 2% and 4% respectively. The approximate regulation on full load at 0·8 pf lag is

   (a) 12%

   (b) 8%

   (c) 6%

   (d) 4%

Download From: http://iasexamportal.com

Download From: http://iasexamportal.com

7. A 3-phase transformer has 420 and 36 turns on the primary and secondary windings respectively. The supply voltage is 3300 V. The secondary line voltage on no-load when the windings are connected in star-delta is nearly

(a) 22260 V

(b) 1908 V

(c) 164 V

(d) 490 V

8. A 4 kVA transformer has iron-loss of 200 W and full load copper loss of 200 W. The maximum efficiency at unity power factor will be

(a) 90·9%

(b) 85·6%

(c) 80·6%

(d) 70·9%

9. A uniformly distributed winding on the stator has three full-pitched coils, each coil having N turns and each turn carrying a current I. The mmf produced by this winding is

(a) sinusoidal in waveform with an amplitude 3 NI

(b) sinusoidal in waveform with an amplitude $3\frac{NI}{2}$

(c) trapezoidal in waveform with an amplitude 3 NI

(d) trapezoidal in waveform with an amplitude $3\frac{NI}{2}$

10. In dc machines, the field-flux axis and armature-mmf axis are respectively along

(a) direct axis and indirect axis

(b) direct axis and inter-polar axis

(c) quadrature axis and direct axis

(d) quadrature axis and inter-polar axis

11. A shunt motor supplied at 250 V, runs at 900 rpm and the armature current drawn is 30 A. The resistance of the armature circuit is 0·4 Ω. The resistance required in series with the armature to reduce the speed to 600 rpm when the armature current is 20 A will be

(a) 3·17 Ω

(b) 2·17 Ω

(c) 5·17 Ω

(d) 4·17 Ω

12. The internal characteristics of a dc generator is plotted between the

(a) field current and voltage generated at no load

(b) armature current and voltage generated on load

(c) armature current and voltage generated after armature reaction

(d) field current and voltage generated on load

Download From: http://iasexamportal.com

Download From: http://iasexamportal.com

13. The drawbacks of 'Armature Resistance Control' method of speed control of a dc motor are

1. A large amount of power is lost in the external resistance R.
2. This method gives the speed below normal values.
3. For a specified value of R, speed reduction is not constant. It varies with motor load.

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

14. A dc motor running at 2000 rpm has a hysteresis loss of 500 W and eddy-current loss of 200 W. The flux is maintained constant but the speed is reduced to 1000 rpm. At the reduced speed the total iron-loss would be

(a) 500 W

(b) 400 W

(c) 300 W

(d) 200 W

15. The speed control of dc shunt motor in both directions can be obtained by

(a) Armature resistance control method

(b) Ward Leonard method

(c) Field diverter method

(d) Armature voltage control method

16. A 10 hp, 240 V dc shunt motor, having armature-circuit resistance of 0·5 Ω and a full-load current of 40 A, is started by a starter, such that sections of required resistances in series with the armature-circuit should limit the starting current to 150% of the full-load current. The steady-state emf developed by the machine at full-load when the arm of the starter is moved to the next step is

(a) 120 V

(b) 100 V

(c) 80 V

(d) 60 V

17. A synchronous motor operates at rated voltage and frequency and has a load torque angle of 30°. If both the terminal voltage and frequency are reduced by 10%, then

(a) the load torque angle remains the same

(b) the load torque angle increases

(c) the load torque angle decreases

(d) nothing can be said about the torque angle

18. The nature of armature mmf for a zero power factor lagging load in a 3-phase alternator is

(a) magnetizing

(b) de-magnetizing

(c) neutral

(d) cross-magnetizing

Download From: http://iasexamportal.com

Download From: http://iasexamportal.com

19. The flux/pole in a synchronous motor with stator not connected to supply is Φ_1 and when connected to supply it is $\frac{3}{4}\Phi_1$. The no-load current drawn from the supply under this condition would be

(a) lagging the supply voltage

(b) leading the supply voltage

(c) in phase with the supply voltage

(d) zero

20. A cylindrical-rotor generator with internal voltage 2·0 pu and X_s = 1·0 pu is connected by a line of reactance 0·5 pu to a round-rotor synchronous motor of synchronous reactance 1·2 pu and excitation voltage 1·35 pu. When 0·5 pu power is supplied by the generator, the electrical angular difference between the rotors would be

(a) 25°

(b) 30°

(c) 60°

(d) 120°

21. The synchronizing power for one mechanical degree of displacement for a 3-phase, 20000 kVA, 6600 V, 50 Hz, 12-pole machine having X_s = 1·65 Ω and negligible resistance is

(a) 1024·6 kW

(b) 921·9 kW

(c) 782·6 kW

(d) 1182·6 kW

22. For obtaining very quick braking of a 3-phase, wound-rotor induction motor running on load

(a) a large external resistance has to be inserted in the rotor-circuit

(b) a large external resistance has to be inserted in the stator-circuit

(c) interchange any two terminals of the stator supply

(d) interchange any two terminals of the rotor to the slip-rings

23. Consider the following statements :

As a three-phase induction motor is loaded from no-load to rated load,

1. There is an improvement in the power factor
2. The torque increases almost in proportion to slip
3. The air-gap flux falls sharply

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

Download From: http://iasexamportal.com

Download From: http://iasexamportal.com

24. A small 3-phase induction motor has a short-circuit current 5 times of full-load current and full-load slip 5%. If starting resistance starter is used to reduce the impressed voltage to 60% of normal voltage, the starting torque obtained in terms of full load torque would be

(a) 30%

(b) 45%

(c) 55%

(d) 80%

25. The frequency of rotor emf of an 8-pole induction motor is 2 Hz. If the supply frequency is 50 Hz, then the motor speed is

(a) 1500 rpm

(b) 750 rpm

(c) 375 rpm

(d) 720 rpm

26. For a given applied voltage and current, the speed of a universal motor will be

(a) higher in dc excitation than in ac excitation

(b) higher in ac excitation than in dc excitation

(c) same in both dc and ac excitations

(d) dangerously high in dc excitation

27. Two single-phase transformers A and B with equal turn's ratio have reactances of j3 Ω and j9 Ω referred to secondary. When operated in parallel, the load-sharing of 100 kW at 0·8 pf lag between A and B transformers would respectively be

(a) 75 kW and 25 kW

(b) 60 kW and 40 kW

(c) 20 kW and 80 kW

(d) 25 kW and 75 kW

28. Compared to turbines in the conventional coal-fired thermal stations, nuclear power plant turbines use steam at

(a) higher pressure and higher temperature

(b) lower pressure and lower temperature

(c) higher pressure and lower temperature

(d) lower pressure and higher temperature

29. In an L-section filter, a bleeder resistance connected across the load

(a) provides good regulation for all values of load

(b) ensures lower PIV of the diodes

(c) ensures lower values of capacitance in the filter

(d) reduces ripple content

Download From: http://iasexamportal.com

Download From: http://iasexamportal.com

30. The power output from a hydro-electric power plant depends on

(a) head, type of dam and discharge

(b) head, discharge and efficiency of the system

(c) type of draft tube, type of turbine and efficiency of the system

(d) type of dam, discharge and type of catchment area

31. Incremental fuel costs of two units A and B of a power station are

$$\frac{dF_A}{dP_A} = 0.4\ P_A + 400$$

$$\frac{dF_B}{dP_B} = 0.48\ P_B + 320$$

For the minimum cost of generation of a total load of 900 MW, the generation allocation for A and B units respectively are

(a) 200 MW and 700 MW

(b) 300 MW and 600 MW

(c) 400 MW and 500 MW

(d) 500 MW and 400 MW

32. A power station has a maximum demand of 2500 kW and number of kWh generated per year is 45×10^5. The load factor is

(a) 10·25%

(b) 20·5%

(c) 41%

(d) 82%

33. A long overhead lossless power transmission line is terminated with its characteristic impedance. While the line is in operation

(a) a resonance of reactive powers occurs in the line

(b) the line becomes purely inductive

(c) the line becomes purely capacitive

(d) there is no reflected wave on the line

34. For exact compensation of voltage drop in the feeder, the booster must

(a) be earthed

(b) work on line voltage

(c) work on its linear portion of V-I characteristics

(d) work on its non-linear portion of V-I characteristics

Download From: http://iasexamportal.com

Download From: http://iasexamportal.com

35. A 100 MVA, 50 Hz turbo-generator operates at no load at 3000 rpm. A load of 25 MW is suddenly applied to the machine and the steam valve to the turbine commences to open after 0·6 seconds due to the governor time-lag. Assuming the inertia constant $H = 5{\cdot}0$ kW-s per kVA of the generator rating, the frequency to which the generated voltage drops before the steam-flow commences to meet the new load is

(a) 49·0 Hz

(b) 50·15 Hz

(c) 49·24 Hz

(d) 49·82 Hz

36. In case of single line to ground fault

(a) all sequence networks are connected in parallel

(b) all sequence networks are connected in series

(c) positive and negative sequence networks are connected in parallel

(d) zero and negative sequence networks are connected in series

37. What is the region of operation of a 3-phase inverter employing sinusoidal PWM when the peak-to-peak values of both the carrier and the modulating waves are made equal ?

(a) Linear modulation

(b) Over modulation

(c) Boundary of linear modulation and over modulation

(d) Six-step operation

38. Which of the following circuit breakers has the lowest voltage range ?

(a) SF_6 circuit breaker

(b) Air-blast circuit breaker

(c) Tank type oil circuit breaker

(d) Air-break circuit breaker

39. Which of the following will be provided to reduce the harmonics on the ac side of an HVDC transmission line ?

(a) Synchronous motors in over excited condition

(b) Shunt capacitor

(c) Static compensator

(d) Shunt filters

40. Modified McMurray full-bridge inverter works on

(a) voltage commutation

(b) current commutation

(c) load commutation

(d) complementary commutation

Download From: http://iasexamportal.com

Download From: http://iasexamportal.com

41. When a PNP transistor is properly biased, the holes from the emitter

(a) diffuse through the base into the collector region

(b) recombine with the electrons in the base region

(c) recombine with the electrons in the emitter region

(d) diffuse through the emitter to collector

42. In a *P-N* junction diode under reverse bias, the magnitude of electric field is maximum at

(a) the edge of the depletion region on the *P* side

(b) the edge of the depletion region on the *N* side

(c) the centre of the depletion region on the *N* side

(d) the *P-N* junction

43. A silicon diode is preferred to a germanium diode because of its

(a) higher reverse current

(b) lower reverse current and higher reverse break down voltage

(c) higher reverse current and lower reverse break down voltage

(d) None of the above

44. Compared to an ordinary semiconductor diode, a Schottky diode has

(a) higher reverse saturation current and zero cut-in voltage

(b) higher reverse saturation current and higher cut-in voltage

(c) higher reverse saturation current and lower cut-in voltage

(d) lower reverse saturation current and lower cut-in voltage

45. Which of the following is called 'hot carrier diode' ?

(a) PIN diode

(b) LED

(c) Photo diode

(d) Schottky diode

46. In a voltage-series-feedback amplifier with open loop gain A_v and the feedback factor β, the input resistance becomes

(a) $\dfrac{R_i}{(1+\beta A_v)}$

(b) $R_i\sqrt{(1+\beta A_v)}$

(c) $R_i(1+\beta A_v)$

(d) $\dfrac{R_i}{\sqrt{(1+\beta A_v)}}$

Download From: http://iasexamportal.com

Download From: http://iasexamportal.com

47. Ripple-rejection ratio of voltage regulator is the ratio of

(a) output voltage to input ripple voltage

(b) output power to input power of regulator

(c) input power to output power of regulator

(d) input ripple voltage to output ripple voltage

48. Variation in β in a BJT can cause a fixed bias circuit to go

(a) into active mode of operation from saturation mode

(b) out of active mode

(c) out of saturation

(d) into cutoff mode from active mode of operation

49. In a McMurray inverter, diodes are connected in inverse parallel to thyristors to

1. Protect the thyristor
2. Make the turn off of the thyristor successful
3. Make the turn on of the thyristor successful
4. Provide path to the reactive component of the load current

Which of the above statements are correct ?

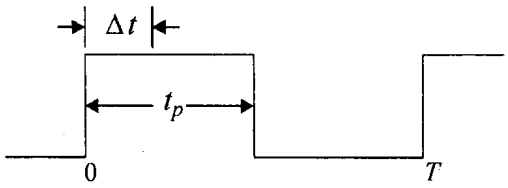
(a) 1 and 3

(b) 1 and 4

(c) 2 and 4

(d) 2 and 3

50. Following pulse is applied to an SR flip flop.



If Δt is propagation delay, which of the following relations should hold to avoid the race condition ?

(a) $t_p < \Delta t < T$

(b) $\Delta t < t_p < T$

(c) $2\Delta t < t_p$

(d) $2\Delta t < t_p < T$

51. For a four variable K-Map, if each cell is assigned one integer value in range 0-15 then which is the cells adjacent to the cell corresponding to decimal value 7 ?

(a) 3, 5, 6 and 8

(b) 3, 5, 10 and 11

(c) 3, 5, 6 and 15

(d) 4, 6, 8 and 15

Download From: http://iasexamportal.com

Download From: http://iasexamportal.com

52. In order to generate a square wave from a sinusoidal input signal, one can use

1. Schmitt trigger circuit
2. Clippers and amplifiers
3. Monostable multivibrator

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

53. An analog voltage in the range of 0-8 V is divided in eight equal intervals for conversion to 3-bit digital output. The maximum quantization error is

(a) 0 V

(b) 0·5 V

(c) 1·0 V

(d) 2·0 V

54. The logic function $A + BC$ is the simplified form of which of the following ?

(a) $AB + BC$

(b) $\overline{A}B + A\overline{B}C$

(c) $\overline{ABC}$

(d) $(A + B)(A + C)$

55. Program counter in a digital computer

(a) counts the numbers of programs run in the machine

(b) counts the number of times a subroutine is called

(c) counts the number of times the loops are executed

(d) points the memory address of the current or the next instruction to be executed

56. Each cell of a static RAM contains

(a) 4 MOS transistors

(b) 4 MOS transistors and 1 capacitor

(c) 2 MOS transistors

(d) 4 MOS transistors and 2 capacitors

57. If an *npn* silicon transistor is operated at $V_{CE} = 5$ V and $I_C = 100\ \mu A$ and has a current gain of 100 in the CE connection, then the input resistance of this circuit will be

(a) 250 kΩ

(b) 450 kΩ

(c) 4500 Ω

(d) 2500 Ω

Download From: http://iasexamportal.com

Download From: http://iasexamportal.com

58. A 4-bit synchronous counter has flip-flops having propagation delay of 50 ns each and AND gates having propagation delay of 20 ns each. The maximum frequency of clock pulses can be

(a) 20 MHz

(b) 50 MHz

(c) 14·3 MHz

(d) 5 MHz

59. A self-starting counter is one that can start

(a) the sequence from initial count and continues its sequence

(b) the sequence from any state among the sequence and continues its normal count sequence

(c) from any state but eventually reaches the required count sequence

(d) None of the above

60. When a program is being executed in an 8085 microprocessor, its program counter contains

(a) the memory address as the instruction that is to be executed next

(b) the memory address of the instruction that is being currently matched

(c) the total number of instructions in the program being executed

(d) the number of instructions in the current program that have already been executed

61. A 'DADH' instruction is the same as shifting each bit by one position to the

(a) left

(b) right

(c) left with a zero inserted in LSB position

(d) right with a zero inserted in LSB position

62. Which one of the following statements is correct about 8086 ?

(a) It is 46 PM IC and uses 5 V dc supply

(b) It uses 20 lines for data bus

(c) It multiplexes status signals with address bus

(d) It is manufactured using CMOS technology

63. During which T-state, contents of OP code from memory are loaded into IR (Instruction Register) ?

(a) T_1 OP code Fetch

(b) T_2 OP code Fetch

(c) T_3 OP code Fetch

(d) T_4 OP code Fetch

Download From: http://iasexamportal.com

Download From: http://iasexamportal.com

64. In 8085 microprocessor, the address for 'TRAP' interrupt is

(a) 0024H

(b) 002CH

(c) 0034H

(d) 003CH

65. Assuming LSB is at position 0 and MSB at position 7, which bit positions are not used (undefined) in Flag Register of an 8085 microprocessor ?

(a) 1, 3, 5

(b) 2, 3, 5

(c) 1, 2, 5

(d) 1, 3, 4

66. At the beginning of a fetch cycle, the contents of the program counter are

(a) incremented by one

(b) transferred to address bus

(c) transferred to memory address register

(d) transferred to memory data register

67. What will be the contents of DE and HL register pairs respectively after the execution of the following instructions ?

LXIH, 2500H

LXID, 0200H

DAD D

XCHG

(a) 0200H, 2500H

(b) 0200H, 2700H

(c) 2500H, 0200H

(d) 2700H, 0200H

68. Direction flag is used with

(a) String instructions

(b) Stack instructions

(c) Arithmetic instructions

(d) Branch instructions

69. XCHG instruction of 8085 exchanges the content of

(a) top of stack with contents of register pair

(b) BC and DE register pairs

(c) HL and DE register pairs

(d) None of the above

Download From: http://iasexamportal.com

Download From: http://iasexamportal.com

70. To interface a slow memory, wait states are added by

(a) extending the time of the chip select logic

(b) causing READY signal to go low

(c) causing READY signal to go high

(d) by increasing the clock frequency

71. A ripple counter with n flip-flops can function as a

(a) n : 1 counter

(b) $\frac{n}{2}$: 1 counter

(c) $2n$: 1 counter

(d) 2^n : 1 counter

72. The relation among IC (Instruction Cycle), FC (Fetch Cycle) and EC (Execute Cycle) is

(a) IC = FC – EC

(b) IC = FC + EC

(c) IC = FC + 2EC

(d) EC = IC + FC

73. Each instruction in an assembly language program has the following fields

1. Label field
2. Mnemonic field
3. Operand field
4. Comment field

What is the correct sequence of these fields ?

(a) 1, 2, 3 and 4

(b) 2, 1, 4 and 3

(c) 1, 3, 2 and 4

(d) 2, 4, 1 and 3

74. A memory system has a total of 8 memory chips, each with 12 address lines and 4 data lines. The total size of the memory system is

(a) 32 k bytes

(b) 48 k bytes

(c) 64 k bytes

(d) 6 k bytes

75. Among the given instructions, the one which affects maximum number of flags is

(a) RAL

(b) POP PSW

(c) XRA A

(d) DCR A

76. The internal characteristic of a dc generator is plotted between the

(a) armature current and voltage generated after armature reaction

(b) field current and voltage generated at no load

(c) field current and voltage generated on load

(d) armature current and voltage generated at the output terminals

Download From: http://iasexamportal.com

Download From: http://iasexamportal.com

77. In 8085 microprocessor with memory mapped I/O, which one of the following is correct ?

(a) I/O devices have 16 bit addresses

(b) I/O devices are accessed during IN and OUT instructions

(c) There can be a maximum of 256 input and 256 output devices

(d) Logic operations cannot be performed

78. Race-around condition occurs in

(a) Multiplexer

(b) ROM

(c) Flip-flops

(d) Voltage regulator

79. The DMA transfer technique where one word data is transferred at a time is called

(a) Cycle stealing

(b) Memory stealing

(c) Hand shaking

(d) Interleaving

80. In a single-phase to single-phase cyclo-converter, the magnitudes of harmonic components are quite large. How can they be reduced ?

(a) By using a chopper circuit

(b) By using an RC oscillator

(c) By using a three phase input supply

(d) By adding an alternator to the input

81. Which one of the following is used for serial I/O transfer in 8085 based system ?

(a) 8251

(b) 8255

(c) 8259

(d) 8279

82. An analog voltage is in the range of 0 to 8 V. It is divided in 8 equal intervals for conversion to 3-bit digital output. The maximum quantization error is

(a) 0 V

(b) 0·5 V

(c) 1 V

(d) 2 V

83. Digital modulation techniques are used in satellite communication system, because

(a) they are easier to handle

(b) large bandwidth utilization is possible

(c) they have a spectral efficiency

(d) they are less prone to interference

Download From: http://iasexamportal.com

Download From: http://iasexamportal.com

84. In FM modulation, when the modulation index increases, the transmitted power is

(a) increased

(b) decreased

(c) unchanged

(d) not related

85. In TV, video signals are transmitted through

(a) amplitude modulation

(b) frequency modulation

(c) either amplitude or frequency modulation

(d) neither amplitude nor frequency modulation

86. If the number of bits per sample in a PCM system is increased from 8 to 16, then the band-width will be increased by

(a) 2 times

(b) 4 times

(c) 8 times

(d) 16 times

87. In a PCM system, a five bit-encoder is used. If the difference between two consecutive levels is 1 V, then the range of the encoder is

(a) 0-31 V

(b) 0-30 V

(c) 1-32 V

(d) 1-30 V

88. Consider the following types of modulation :

1. Amplitude modulation
2. Frequency modulation
3. Pulse modulation
4. Phase modulation

Which of the above modulation are used for telecasting TV programs ?

(a) 2 and 3

(b) 3 and 4

(c) 1 and 2

(d) 1 and 4

89. In a step up operation, what is the condition to be satisfied for controllable power transfer ?

(a) $0 < V_S < E$

(b) $0 < V_S > E$

(c) $V_S < E$

(d) $V_S > E$

90. A Schottky diode is

(a) a majority carrier device

(b) a minority carrier device

(c) a fast recovery dioce

(d) both majority and minority carrier diode

Download From: http://iasexamportal.com

Download From: http://iasexamportal.com

91. An SCR has V_{DRM} = 600 V, $\left(\frac{dv}{dt}\right)_{max}$ = 25 V/μs, and $\left(\frac{di}{dt}\right)_{max}$ = 30 A/μs. It is used to energize a 100 Ω resistance load. What are the minimum values for an RC snubber circuit to avoid unintentional triggering? (V_{DRM} means peak repetitive forward blocking voltage)

(a) T = 10 μs, C = 2·4 μF and R = 4·5 mΩ

(b) T = 24 μs, C = 0·24 μF and R = 4·5 mΩ

(c) T = 24 μs, C = 2·4 μF and R = 7·0 mΩ

(d) T = 10 μs, C = 0·24 μF and R = 7·0 mΩ

92. Maximum string efficiency is achieved when

(a) uniform distribution of voltage across SCRs in a string appears

(b) uneven voltage distribution of voltages across SCRs in a string appears

(c) one of the SCRs shares maximum voltage and rest share same voltage in a string

(d) derating factor = 1-string efficiency

93. For a firing angle of 60° in respect of a single-phase half-wave controlled rectifier with resistive load supplied from a 230 V (rms), 50 Hz supply, the average output voltage would be

(a) 52 V

(b) 77·5 V

(c) 104 V

(d) 155 V

94. The frequency of ripple in the output voltage of a three phase controlled bridge rectifier depends on

(a) firing angle

(b) load inductance

(c) load resistance

(d) supply frequency

95. An SCR requires 50 mA gate current to switch it ON. The driver circuit supply voltage is 10 V. The gate-cathode drop is about 1 V. The resistive load supplied from a 100 V dc supply is

(a) 66 Ω

(b) 73 Ω

(c) 80 Ω

(d) 100 Ω

96. Which is the important factor in the steady-state characteristics of a MOSFET?

(a) Current gain

(b) Transconductance

(c) Output resistance

(d) Drain-source voltage

Download From: http://iasexamportal.com

Download From: http://iasexamportal.com

97. Consider the following statements about IGBT

1. It has high input impedance.
2. It has low ON state voltage drop.
3. Its switching speed is higher than that of the MOSFET.
4. It is a voltage controlled device.

Which of the above statements are correct ?

(a) 1, 2 and 3 only

(b) 2, 3 and 4 only

(c) 1, 2 and 4 only

(d) 1, 2, 3 and 4

98. When the drain voltage in an *n*-MOSFET is negative, it is operating in

(a) active region

(b) inactive region

(c) ohmic region

(d) reactive region

99. The input power factor of the converter circuit may be defined as the ratio of

(a) total mean input power to the total rms input volt amperes

(b) total rms input volt amperes to the total mean input power

(c) total peak input volt amperes to the total rms input volt amperes

(d) total input rms volt amperes to the total input peak volt amperes

100. In a single-phase full bridge inverter what is the advantage of a unipolar switching over the bipolar switching ?

(a) Increase of the fundamental component by a factor of 1·15 for the same DC-input voltage

(b) Elimination of 5th and 7th harmonics

(c) Apparent doubling of the switching frequency

(d) None of the above

101. It is required to control the speed and braking operation of a dc shunt motor in both the directions of rotation. The most suitable power electronic circuit will be

(a) a half-controlled converter

(b) a fully-controlled converter

(c) a diode-bridge converter

(d) a dual converter

102. How can the 3rd harmonic current be filtered in Thyristor-controlled reactor ?

(a) By connecting in delta

(b) By connecting in star

(c) By connecting in star-delta

(d) None of the above

Download From: http://iasexamportal.com

Download From: http://iasexamportal.com

103. For a 1-phase full-bridge inverter fed from 48 V dc and connected to load resistance of 2·4 Ω, the rms value of fundamental component of output voltage is

(a) 20 V

(b) 21·6 V

(c) 34·4 V

(d) 43·2 V

104. A voltage source inverter is used when source and load inductances are respectively

(a) Small and large

(b) Large and small

(c) Large and large

(d) Small and small

Directions :

Each of the next **Sixteen (16)** 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) Statement (I) and Statement (II) are individually true and Statement (II) is the correct explanation of Statement (I)

(b) 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

105. Statement (I) : HVDC transmission is advantageous over HVAC for large power transfer over long lines.

Statement (II) : HVDC requires conversion equipment at two ends of the transmission line.

106. Statement (I) : In the construction of a core-type power transformer, the high-voltage winding is placed around the low-voltage winding in each limb.

Statement (II) : When the high-voltage winding is placed around the low-voltage winding in a core-type transformer, only one layer of high-voltage insulation is required between the two coils.

107. Statement (I) : The magnetization curve of the actual power transformer is non-linear and its effect is to introduce higher-order harmonics in the magnetizing current.

Statement (II) : The effect of the harmonic frequencies can be taken care of by modifying the magnitudes of the phasors involved, and the phasor-diagram at the fundamental frequency, with the assumption of a linear magnetization, remains unaffected.

Download From: http://iasexamportal.com

Download From: http://iasexamportal.com

108. Statement (I) : The core-loss in a transformer is independent of the load current.

Statement (II) : The core is made up of thin laminations interleaved at the joints to avoid air-gaps

109. Statement (I) : When the armature-iron of a dc machine rotates, it goes through the influence of the north and the south poles, thus causing cyclic variations of the linked magnetic flux and resulting in the occurrence of hysteresis loss in the armature core.

Statement (II) : The laminated armature-construction limits the hysteresis loss to a lower value.

110. Statement (I) : Dampers are used in the alternators.

Statement (II) : The voltage fluctuations are not reduced by the damper windings in an alternator.

111. Statement (I) : The rotor of an induction motor rotates in the direction of the rotating magnetic field.

Statement (II) : The rotor will start rotating in such a direction that it will oppose the cause, i.e., the relative speed between the rotating field and stationary rotor conductors should decrease.

112. Statement (I) : The expression for the value of inductance L per conductor of an un-symmetrically spaced 3-phase overhead transmission line contains an imaginary term.

Statement (II) : The presence of the imaginary term is due to the mutual inductance between the phase conductors and can be eliminated by symmetrically transposing the three line-conductors along the length of the line.

113. Statement (I) : A large negative feedback is deliberately introduced in an amplifier to make its gain independent of variation in parameters of active device and other components.

Statement (II) : A large negative feedback results in a high value of return difference compared to unity which makes the feedback gain inversely proportional to feedback factor.

114. Statement (I) : An astable multivibrator is also called a free-running oscillator.

Statement (II) : An astable multivibrator circuit forces an operational amplifier to operate in the saturation region.

Download From: http://iasexamportal.com

Download From: http://iasexamportal.com

115. Statement (I) : An ideal op amp should have infinite band-width.

Statement (II) : An ideal op amp should have infinite input resistance and zero output resistance.

116. Statement (I) : Ready signal of microprocessor is used to detect whether a peripheral is ready for the data transfer or not.

Statement (II) : In the microprocessor during data transfer operations, the wait states are added by forcing the ready signal low.

117. Statement (I) : The main difference between a micro-processor and a micro-controller is that the former does not have any on-chip memory.

Statement (II) : A micro-processor does not need memory to run programmes.

118. Statement (I) : Frequency division multiplexing uses analog modulation systems.

Statement (II) : Multiplexing helps transmitting a number of data simultaneously over a single channel.

119. Statement (I) : A Gate Turn-Off is a *pnpn* device which can be turned on by a pulse of positive gate current and turned off by a negative pulse.

Statement (II) : A chopper is a static device which converts fixed dc input voltage to variable dc output voltage.

120. Statement (I) : A switched-mode dc power supply has high efficiency and light weight.

Statement (II) : A switched mode power supply uses a dc to dc switching converter switched at high frequency.

Download From: http://iasexamportal.com

Download From: http://iasexamportal.com

SPACE FOR ROUGH WORK

Download From: http://iasexamportal.com

Download From: http://iasexamportal.com

SPACE FOR ROUGH WORK

Download From: http://iasexamportal.com

Download From: http://iasexamportal.com

SPACE FOR ROUGH WORK

Download From: http://iasexamportal.com