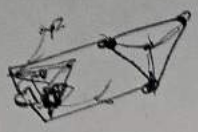
(44) Marks 080079

99 Theory

Paper Code No: M46 **Question Booklet No. .....**



ENTRANCE EXAMINATION – 2020 - 21

SET – C

Roll No. | M | 4 | 6 | 0 | 8 | 0 | 7 | 9 | |

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Signature of Invigilator

Time: 1 Hour 30 Minutes **Total Marks: 100**

Instructions to Candidates

1. Do not write your name or put any other mark of identification anywhere in the OMR Answer Sheet. IF ANY MARK OF IDENTIFICATIONS IS DISCOVERED ANYWHERE IN OMR RESPONSE SHEET, the OMR sheet will be cancelled, and will not be evaluated.
2. **This Question Booklet contains the cover page and a total of 100 Multiple Choice Questions of One mark each.**
3. Space for rough work has been provided at the beginning and end. Available space on each page may also be used for rough work.
4. There is negative marking in Multiple Choice Questions. For each wrong answer, 0.25 marks will be deducted.
5. USE/POSSESSION OF ELECTRONIC GADGETS LIKE MOBILE PHONE, iPhone, iPad, pager ETC. is strictly PROHIBITED.
6. Candidate should check the serial order of questions at the beginning of the test. If any question is found missing in the serial order, it should be immediately brought to the notice of the Invigilator. No pages should be torn out from this question booklet.
7. Answers must be marked in the OMR Response sheet which is provided separately. OMR Response sheet must be handed over to the invigilator before you leave the seat.
8. The OMR Response sheet should not be folded or wrinkled. The folded or wrinkled OMR/Response Sheet will not be evaluated.
9. Write your Roll Number in the appropriate space (above) and on the OMR Response Sheet. Any other details, if asked for, should be written only in the space provided.
10. There are four options to each question marked A, B, C and D. Select one of the most appropriate options and fill up the corresponding oval/circle in the OMR Response Sheet provided to you. The correct procedure for filling up the OMR Answer Sheet is mentioned below.

CORRECT METHOD
(A) ● (C) (D)

WRONG METHODS					
(A) ⊗ (C) (D)	(A) ✓ (C) (D)	(A) ◐ (C) (D)	(A) ● (C) (D)	(A) ● (C) ● (D)	(A) ● (C) ●

1. A synchronous machine having $E = 1.1\ pu$ is feeding an infinite bus with voltage of $1pu$. If the transfer reactance is $0.5pu$, the steady state power limit is

(a) $1.1pu$ (b) $0.55\ pu$

(c) $2.2\ pu$ (d) $2.6\ pu$

2. The electrical length of a half tuned wave length line is

(a) $120°$ (b) $180°$

(c) $90°$ (d) $45°$

3. The charging current in transmission line increases due to corona effect because corona increases

(a) Line current (b) Power loss in the line

(c) Effective line voltage (d) Effective conductor diameter

4. A cable of surge impedance 50 ohms is terminated by a resistance of 50 ohms. The reflected quantities are

(a) 0 (b) Equal to incident quantities

(c) Half the incident quantities (d) Double the incident quantities

5. An 11 kV alternator with 8% reactance will have 2% reactance at

(a) 22 kV (b) 44 kV

(c) 5.5 kV (d) 1.1 kV

6. Zero sequence currents flow in a transmission line when there is

(a) Double line to ground fault

(b) An over voltage on the line due to charged cloud

(c) Line of line fault

(d) 3 phase fault

7. For a power transformer

(a) Positive, negative and zero sequence impedances are all equal

(b) Positive sequence impedance is more than negative sequence and zero sequence impedances

(c) Positive and negative sequence impedances are equal

(d) Positive sequence impedances is less than negative and zero sequence impedances

8. For adequate mechanical strengths the minimum thickness of steel strips for earthing grid should be

(a) 10 mm

(b) 5 mm

(c) 3 mm

(d) 1 mm

9. A line to line fault is restricted by

(a) Positive and negative sequence impedances

(b) Positive and zero sequence impedances

(c) Negative and zero sequence impedances

(d) Positive, negative and zero sequence impedances

10. In a soil resistivity measurement test the distance between successive electrodes was D, current I and voltage V then soil resistivity=

(a) $\frac{\pi DV}{I}$ (b) $\frac{2\pi DV}{I}$

(c) $\frac{4\pi DV}{I}$ (d) $\frac{\pi D^2 V}{I}$

11. It is preferable to use a train of pulse of high frequency for gate triggering of SCR in order to reduce.

(a) dv/dt problem

(b) di/dt problem

(c) the size of the pulse transformer

(d) the complexity of the firing circuit

12. A four quadrant chopper cannot be operated as

(a) One quadrant (b) Cycloconverter

(c) Inverter (d) Bi-directional rectifier

13. The total harmonic distortion (THD) of ac supply input current of rectifier is maximum for

(a) Single-phase diode rectifier with de inductive filter

(b) 3-phase diode rectifier with de inductive filter

(c) 3-phase thyristor rectifier with inductive filter

(d) Single -phase diode rectifier with de capacitive filter

14. The most suitable solid state converter for controlling the speed of the three-phase cage motor at 25 Hz is

(a) Cycloconverter
(b) Current source inverter
(c) Voltage source inverter
(d) Load accumulated inverter

15. The operation of an inverter fed induction motor can be shifted from motoring to regenerative braking by

(a) Reversing phase sequence
(b) Reducing inverter voltage
(c) Decreasing inverter frequency
(d) Increasing inverter frequency

16. Turn-on and turn-off times of transistor depend on

(a) Static characteristic
(b) Junction capacitance
(c) Current gain
(d) Terminal temperature

17. In the buck-boost converter, what is the maximum value of the switch utilization factor?

(a) 1.00
(b) 0.75
(c) 0.50
(d) 0.25

18. A gate turn off (GTO) thyristor has capacity to

(a) Amplify the gate-current
(b) Turn-off when positive current pulse is given at the gate
(c) Turn-off when a gate-pulse is given at the gate even through it is reverse biased
(d) Turn-off when a negative current pulse is given at the gate

19. Which of the following statement is not correct?

(a) Power MOSFETs are so constructed as to avoid punch through

(b) In a power MOSFET, the channel length is relatively large and channel width is relatively small

(c) Power MOSFETs do not experience any minority carrier storage

(d) Power MOSFETs can be put i n parallel to hand le large currents

20. When the firing angle a of a single phase fully controlled rectifier feeding constant de current into the load is 30°, what is the displacement factor of the rectifier?

(a) 1 (b) 0.5

(c) $\sqrt{3}$ (d) $\frac{\sqrt{3}}{2}$

21. The number of subconductors in each phase of EHY lines in India is

(a) 4 (b) 3

(c) 2 (d) 8

22. For a stranded conductor, the ratio of GMR to actual radius is

(a) Equal to 1 (b) Equal to 0.7788

(c) Less than 0.7788 (d) Equal to 1.1

23. The presence of ground causes the line capacitance to

(a) Increase by about 10% (b) Decrease by about 10%

(c) Increase by about 0.2% (d) Decrease by about 0.2%

24. For a transmission line

$V_s = A V_r + B I_r$

$I_s = C V_r + D I_r$

Then I equals

(a) $-C V + A I$ (b) $D V + A I$

(c) $D V - B I$ (d) $A V + D I$

25. To obtain the minimum value of stress in cable the ratio R/r should be

(a) 2.13 (b) 2.718

(c) 1.96 (d) 1.1

26. A suitable value of acceleration factor for load flow studies is

(a) 2.2 (b) 1.6

(c) 1.1 (d) 3. L

27. For a fault at generator terminals the fault current is maximum for

(a) 3-phase fault (b) L-L fault

(c) SLG fault (d) DLG fault

28. A line of surge impedance 400 ohms is terminated by a resistance of 400 ohms. The reflected quantities are

(a) 0 (b) Equal to incident quantities

(c) Half the incident quantities (d) Double the incident quantities

29. The lines with horizontal configuration usually have

(a) One ground wire (b) Two ground wires

(c) Four ground wires (d) No ground wire

30. The inertia constant H of a turbo generator of 200 MVA is 6. The value of H corresponding to a base of 300 MVA will be

(a) 9 (b) 4

(c) 6 (d) 13.5

31. A fully controlled line commutated converter functions as an inverter when firing angle (α) is in the range

(a) 0°- 90°

(b) 90° - 180°

(c) 90° - 180° only when there is a suitable dc source in the load

(d) 90° - 180° only when it supplies a back e.m.f. load

32. Which of the following device should be used as a switch in a low power switched mode power supply (SMPS)

(a) GTO (b) MOSFET

(c) TRIAC (d) THYRISTER

33. A single phase ac voltage controlled is controlling current in a purely inductive load. If the firing angle of the SCR is α, what will be the conduction angle of the SCR?

(a) π (b) (π - α)

(c) (2π - α) (d) 2α

34. Which of the following i s the main advantage of SMPS over linear power supply?

(a) No transformer is required (b) Only one stage of conversion

(c) No filter is required (d) Low power-distortion

35. A modern power semiconductor device that combine the characteristic of BJT and MOSFET is

(a) GTO (b) FCT

(c) IGBT (d) MCT

36. A large de motor is required to control the speed of blower from a 3-phase ac source. What is the most suitable ac to de converter?

(a) 3-phase fully controlled bridge converter

(b) 3-phase fully controlled bridge converter with free-wheeling diode

(c) 3-phase half-controlled bridge converter

(d) A pair of 3-phase converter in sequence control

37. In a dual converter, the circulating current

(a) Allows smooth reversal of load current, but increases the response time

(b) Allows smooth reversal of load current with improved speed of response

(c) Does not allow smooth reversal of load current, but reduces the response time

(d) Flows if there is no interconnecting inductor

38. An AC voltage-regulator using back-to-back connected SCRs is feeding an RL load. The SCR firing angle $a<\Phi$ (Φ is power factor angle of the load). If SCRs are fired using short-duration gate pulses, the output load-voltage waveform will be

(a) Symmetrical chopped ac voltage

(b) Half-wave rectified

(c) Full-wave rectified

(d) Sinusoidal

39. Consider the following statements:

1. Both voltage source inverter and current source inverter require feedback diodes.
2. Only current source inverter requires feedback diodes.
3. GTOs cannot be used in a current source inverter.
4. GTOs cannot be used in a voltage source inverter.

Which of the statement given above is/are correct?

(a) 1 (b) 2

(c) 3 (d) 4

40. What is the maxim um output voltage of a 3-phase bridge rectifier supplied with line voltage of 440 V?

(a) 528 V (b) 396 V

(c) 594 V (d) 616 V

41. When the frequency of the rotor of an induction motor is small it can be measured by

(a) Galvanometer (b) de moving coil milli-voltmeter

(c) de moving coil ammeter (d) ac voltmeter

42. The repulsion-start induction-run motor is used because

(a) high efficiency (b) high starting torque

(c) minimum cost (d) good power factor

43. Synchronizing torque will come into operation whenever

(a) There is an equivalence in the magnitude of voltages

(b) There is no phase difference in the voltages

(c) There is no frequency difference between the two voltages

(d) Excitation of one of the alternators is changed

44. If the voltage of one of the two machines operating in the parallel suddenly falls

(a) Both the machines will stop

(b) The machine whose voltage has suddenly decreased, will stop

(c) The synchronous torque will come into operation to restore synchronism

(d) None of the above

45. The doubly-excited magnetic system are

(a) Moving iron instruments (b) Electromagnetic relays

(c) Solenoids (d) Synchronous motor

46. In two induction motors, running at the same speed and having same number of poles, the physical dimensions are in the ratio of 3:2. The output of both the motors will be in the ratio of

(a) 3:2 (b) 9:4

(c) 27:8 (d) 81:16

47. The most suitable rotor for a turbo-alternator designed to operate at high speed is

(a) Salient pole type rotor (b) Smooth cylindrical type rotor

(c) Squirrel cage rotor (d) Either of the above

48. In a shaded pole motor, the rotating field is developed by using

(a) Salient poles (b) A capacitor

(c) Shading coil (d) Damper winding

49. A machine is driven by an induction motor running at nominal speed. What happens if the counter torque of the machine becomes larger than the maximum torque of the motor?

(a) The induction motor heats up to an inadmissible extent.

(b) The induction motor stops.

(c) The speed of the induction motor is reduced to less than half of its nominal speed.

(d) The winding of the motor can be damaged because of high current strength.

50. During a short circuit test of a transformer, the iron losses are negligible because

(a) The mutual flux is small

(b) The power factor is low

(c) The current is high

(d) None of these

51. Which of the following statements associated with repulsion motor is wrong?

(a) Its direction of rotation depends upon the position of brushes.

(b) Its characteristics are similar to those of series motor.

(c) Its power factor is high.

(d) It is used where sturdy motor with large starting torque and adjustable but constant speed is required.

52. Sludging of transformer oil means

(a) Continuous expansion and contraction due to heating and cooling

(b) Formation of semi-solid hydrocarbon due to heat and oxidation

(c) Decomposition of transformer oil under the influence of power arcs

(d) Evaporation of transformer oil due to heating

53. An alternator is connected to the bus bars and is supplying load. Its prime mover is suddenly shut down. The alternator will

(a) Continue to work as alternator

(b) Continue to run as synchronous motor but direction of rotation wi 11 reverse

(c) Continue to run as synchronous motor and the direction of rotation will remain the same

(d) Start generating more reactive power

54. Reluctance torque in rotating machines is present when

(a) Airgap is not uniform

(b) Reluctance seen by stator mmf is constant

(c) Reluctance seen by rotor mmf varies

(d) Reluctance seen by rotor mmf is constant

55. The polarity of a d.c. generator is reversed by reversing the direction of

(a) Field current as well as rotation (b) Rotation

(c) Field current (d) Armature reaction

56. A d.c. machine used as a generator has an efficiency of 90% when the output voltage and current are 220 V and 10A respectively. If the machine is used as a motor and takes 10 A from 220 V supply the efficiency will be

(a) 90%

(b) Less than90%

(c) More than 90%

(d) Half the original efficiency

57. Flashing of field of de generator means

(a) Neutralization of residual magnetism

(b) Creation of residual magnetism by a de source

(c) Increasing flux density by providing extra ampere-turns in field

(d) Connecting it to de grid

58. In a d.c. machine

(a) The current and emf in armature conductors are alternating while those at the terminals are unid irectional

(b) The current and emf in armature conductors are unidirectional while those at the terminals are alternating

(c) The current and emf in armature conductors are at the terminals are unidirectional

(d) The emf in armature conductors and at the terminals is alternating while current there is unidirectional

59. If diameter and speed of the stator bore of the high-speed turbo-alternator and a low- speed hydel generator of identical ratings are compared, then

(a) The turbo-alternator has larger diameter and larger length

(b) The turbo-alternator has smaller diameter and smaller axial length

(c) The turbo-alternator has larger diameter and smaller axial length

(d) The turbo-alternator has smaller diameter and larger axial length

60. The leakage flux of a transformer is defined as following

(a) It is the flux which is l inked with the primary and the secondary winding

(b) It is the magnetic flux which is linked either only with the primary or only with the secondary

(c) It is the flux whose path is exclusively through the air

(d) None of these

61. Half wave rectifier type AC meters are used as voltmeters. They cannot used as ammeters because

(a) Pointer would oscillate with AC

(b) AC current would be too small to read

(c) AC current would be excessive

(d) AC is changed to DC

62. On testing an electric iron on megger, the reading of megger is infinity. This indicates

(a) Short circuit of the heating element

(b) Short circuit of the supply terminal

(c) Loose terminal connections

(d) Open circuit of the heating element

63. W_1 and W_2 are the readings of two wattmeters used to measure power of a 3- phase balanced load. The reactive power drawn by the load is

(a) $W_1 + W_2$

(b) $W_1 - W_2$

(c) $\sqrt{3}\,(W_1 + W_2)$

(d) $\sqrt{3}\,(W_1 - W_2)$

64. The function of a shunt i n an ammeter is to

(a) Increase the instruction resistance

(b) Bypass the current

(c) Reduce the voltage drop across the instrument coil.

(d) Increase the current flowing through the instrument coil

65. The most commonly used type of single phase energy meter is

(a) Dynamometer type

(b) Electrostatic type

(c) Induction type

(d) Moving coil type

66. The bridge used for the measurement of dielectric loss of capacitance is

(a) Anderson bridge (b) Maxwell bridge

(c) Hay bridge (d) Schering bridge

67. The dissipation factor of capacitor can be measured by using a

(a) Potentiometer (b) Campbell bridge

(c) Schering bridge (d) Galvanometer

68. Moving iron instruments are usually used as

(a) Standard instruments for calibration of other instruments owing to their higher accuracy and lower cost

(b) Transfer type instruments as they indicate the same values for de as well as ac measurements and are cheaper

(c) Ordinary indicating instruments because of their robust construction

(d) None of these

69. When current transformers are not in use, the secondary should be

(a) Fused (b) Open-circuited

(c) Short-circuited (d) Grounded with the primary

70. Hysteresis error, in moving iron instruments may be reduced by using

(a) Mumetel or permalloy (b) Stainless steel

(c) Silver coating (d) High speed steel

71. In force current analogy, mass is analogous to

(a) Current (b) Resistance

(c) Capacitance (d) Voltage

72. Type- 1 system under parabolic input will have

(a) Parabolic input

(b) Actuating signal increasing with time

(c) Actuating signal decreasing with time

(d) Constant actuating signal

73. Damping is proportional to Gain

(a) Gain (b) 1/gain

(c) $1/\sqrt{gain}$ (d) $\sqrt{gain}$

74. Control system are normally designed with damping factor

(a) Less than unity (b) Of unity

(c) Of zero (d) More than unity

75. For an *n*th order system the state equations will be of the order of

(a) n (b) 1

(c) n/2 (d) $\frac{n+1}{2}$

76. When the gain margin is positive and the phase margin is negative, the system is

(a) Stable (b) Unstable

(c) Oscillatory (d) Highly stable

77. Factor not imparted by feedback to a system are

1. Increased accuracy and reduce sensitivity of output/input ratio to variations in system characteristics.
2. Reduced effect of non-linearities and increased bandwidth
3. Tendency towards oscillation or instability.
4. Reduced effect of linearities and deceased bandwidth The correct choice for this equation is

The correct choice for this equation is

(a) (1) and (2) only (b) 2

(c) 3 (d) 4

78. The thermal resistivity of soil around

(a) 0.2°C-m/Watt (b) 1.5°C-m/Watt

(c) 5°C-m/Watt (d) 10°C-m/Watt

79. In Routh-Hurwitz criterion, if all the elements in one row and zero, then they are

(a) Pairs of conjugate roots on imaginary axis

(b) Pairs of equal roots with opposite signs

(c) Conjugate roots forming a quadrate in the s-plane

(d) All of the above

80. For stability of AC servo-motor

(a) A negative slope on the torque speed curve is necessary

(b) Linearized positive torque-speed curve is essential

(c) The ratio of the rotor reactance to rotor resistance should be high

(d) Positive speed-torque curve

81. If b is the number of branches and n the number of nodes in a connected graph, the number of links corresponding to any tree of the graph is

(a) $n + 1 - b$

(b) $b - n + 1$

(c) $b - n - 1$

(d) $n - b - 1$

82. Arrange the topological duals from the given list

A	Loop	1	Link
B	Twig	2	Node
C	Mesh	3	cut set

	A	B	C
(a)	1	2	3
(b)	1	3	2
(c)	3	1	2
(d)	3	2	1

83. The condition for reciprocity of a two-port network having different parameters are: (i) $h_{12} = -h_{21}$ (ii) $g_{12} = g_{21}$ (ii i) A = D (iv) B-D=C

Choose the correct combination

(a) 1 (b) 2

(c) 3 (d) 4

84. Two network N_a and N_b have hybrid parameters h_a and h_b respectively. The two networks are connected in casecade. The overall parameters are:

(a) $[h_a] + [h_b]$ (b) $[h_a] - [h_b]$

(c) $[h_a]\,[h_b]$ (d) none of these

85. An ideal transformer with ratio n:1 is terminated through a capacitance C at port 2. At port 1 will appear as

(a) An inductor of value n^2C (b) A capacitance of value n^2C

(c) An inductor of value c/n^2 (d) A capacitance of value c/n^2

86. The final value of the function

$$f(s) = \frac{3s+2}{s^4+6s^3+10s^2+s} \text{ is}$$

(a) 1 (b) 2

(c) zero (d) infinity

87. The transfer function of an electrical low-pass RC network is

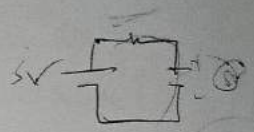
(a) $\frac{RCs}{1+RCs}$ (b) $\frac{1}{1+RCs}$

(c) $\frac{RC}{1+RCs}$ (d) $\frac{s}{1+RCs}$

88. The steady-state current in the RC series circuit, on the application of a step voltage of magnitude E will be

(a) Zero (b) E/R

(c) (E/R) exp-t/RC (d) (E/RC)exp-t



89. The overall inductance of two coils connected in series, with mutual conductance aiding self-inductance is L_1; With mutual inductance opposing self-inductance, the overall inductance is L_2. The mutual inductance M is given by

(a) $L_1 + L_2$ (b) $L_1 - L_2$

(c) $\frac{1}{4}(L_1 - L_2)$ (d) $\frac{1}{2}(L_1 + L_2)$

90. A unit impulse input to a linear network has a response R(t) and a unit step input to the same network has a response S(t). The response R(t)

(a) equals $\frac{ds}{dt}(t)$ (b) equals the integral of $S(t)$

(c) is the reciprocal of $S(t)$ (d) has no relation with $S(t)$

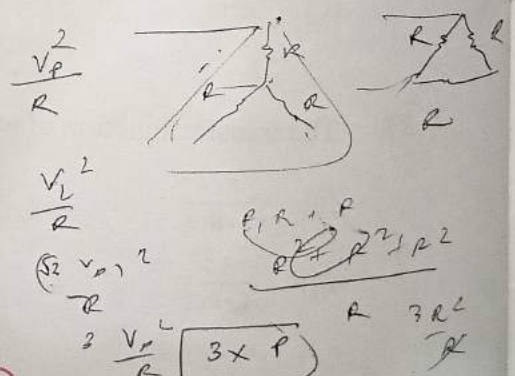
91. A 3-phase star-connected symmetrical load consumes P watts power from a balanced supply. If the same load is connected in delta to the same supply, the power consumption will be

(a) P

(b) $\sqrt{3}P$

(c) 3P

(d) Not determinable from the given data



92. The transfer function, $T(s) = \frac{s^2}{s^2+as+b}$ belongs to an active

(a) Low-pass filter
(b) High-pass filter
(c) Band-pass filter
(d) Band-reject filter

93. A Hurwitz polynomial has

(a) Zeros only in the left half of the s-plane
(b) Poles only in the left half of the s-plane
(c) Zeros anywhere in the s-plane
(d) Poles on the jω axis only

94. For an all-pass function zeros are in the

(a) right half plane (RHP) and poles in the left half plane (LHP)
(b) LHP and poles in LHP.
(c) LHP and poles in RHP.
(d) RHP and poles in RHP.

95. The residues at the pole of Y(s) of an RC network are;

(a) Real and negative
(b) Real and positive
(c) Complex with positive real part
(d) Complex with negative real part

96. The mutual inductance between two coupled coils is 10 mH. If the turns in one coil are doubled and that in the other are halved, then the mutual inductance will be

(a) 5 mH (b) 10 mH

(c) 14 mH (d) 20 mH

97. To improve the power factor in three-phase circuits, the capacitor bank is connected in delta to make

(a) Capacitance calculation easy.

(b) Capacitance value small.

(c) The connection elegant

(d) The power factor correction more effective.

98. A three-phase heating un it and induction motor are connected in parallel across a 208 V three-phase supply. Motor is rated at 5hp, 0.8 pf with efficiency of 0.85. Heating unit is rated at 1500W. The line current will be equal to

(a) 185 A (b) 1.85 A

(c) 18.5 A (d) 15 A

99. If a network has all Linear elements except for a few non-Linear ones, then superposition theorem.

(a) Cannot hold at all

(b) Always holds

(c) May hold on careful selection of element values, source waveform and response.

(d) Holds in case of direct current excitations

100. Which one of the following theorems is a manifestation of the law of conservation of Energy?

(a) Tellengen's theorem

(b) Reciprocity theorem

(c) Thevenin's theorem

(d) Superposition theorem.