Sr. No. 10035

ENTRANCE TEST-2024

2-Year M Tech Programme

Power System and Control Engineering

Total Questions : 60
Time Allowed : 70 Minutes

Roll No. | | | | | | |

1. Write your roll number in the space provided at the top of this page of question booklet and fill up the necessary information in the spaces provided on OMR Answer sheet.
2. OMR Answer sheet has an original copy and a candidate's copy glued beneath it at the top. While making entries in the original copy, candidate should ensure that the two copies are aligned properly so that the entries made in the original copy against each item are exactly copied in the candidate's copy.
3. All entries in the OMR answers sheet including answers to questions are to be recorded in the original/Carbon copy.
4. Use only blue/ black ball point pen to darken the circle of correct / most appropriate response. In no case gel/ ink pen or pencil should be used.
5. **Do not darken more the one circle of option for any question. A question with more than one darkened response shall be considered wrong.**
6. **There will be negative marking for wrong answers. Each wrong answer will lead to th deduction of 0.25 marks from the total score of the candidate.**
7. Only those candidates who would obtain positive score in entrance test examination shall be eligible for admission.
8. Do not make any stray mark on the OMR sheet.
9. Calculators and mobiles shall not be permitted inside the examination hall.
10. Rough work, if any, should be done on the blank sheets provided with the question booklet.
11. OMR answer sheet must be handled carefully and it should not be folded or mutilated in such case it will not be evaluated.
12. Ensure that your OMR Answer sheet has been signed by the invigilator and the candidate himself/herself.
13. At the end of the examination hand over the OMR answer sheet to the invigilator who will first tear off the original OMR sheet in presence of the candidate and hand over the candidate's copy to the candidate.
14. If any of the information in the response Sheet/Question Paper has been found missing or not mentioned as stated above the candidate is solely responsible for that lapse.

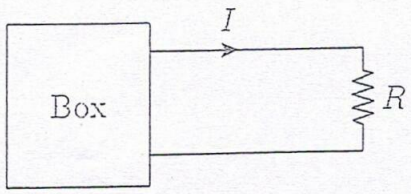
SEAL

Q1. The equivalent resistance of four parallel resistances is 40 Ω. The currents through them are 0.4, 0.5, 0.3 and 0.2 A. The lowest resistance in ohms is

a) 112
b) 280
c) 56
d) 560

Q2. The box contains a resistor and independent sources. For R = 0 Ω and 10 Ω, the value of current is 5 A and 2.5 A, respectively. The value of I in A for R = 5 Ω will be

a) 3.33
b) 33.3
c) 22.5
d) 2.25



Q3 P: "Relative permeability of the core is ordinarily huge." Q: "Leakage flux is usually quite small in magnetic circuits."

T = True; F = False

a) Both P and Q are T and P explains Q
b) P is T but Q is F
c) Both P and Q are T and P does not explain Q
d) P is F but Q is T

Q4 P: "Reluctance and Resistance are analogous." Q: "Flux and Current are analogous."

T = True; F = False

a) Both P and Q are T and P explains Q
b) P is F but Q is T
c) Both P and Q are T and P does not explain Q
d) P is T but Q is F

Q5 P: "Saturation is commonly seen in ferromagnetic materials." Q: "Saturation does not occur in ferromagnetic materials when excited with AC flux."

T = True; F = False

a) Both P and Q are T and P explains Q
b) P is F but Q is T
c) Both P and Q are T and P does not explain Q
d) P is T but Q is F

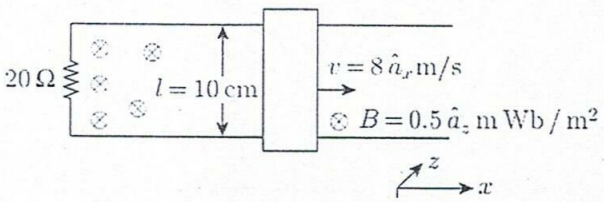
Q6 P: "Cores are conduits or paths for magnetic flux that are ordinarily made of Fe and its alloys." Q: "Fe alloys, like steel, can be very strong mechanically ."

T = True; F = False

a) Both P and Q are T and Q explains P
b) P is F but Q is T
c) Both P and Q are T and Q does not explain P
d) P is T but Q is F

Q7 The rod can freely slide on the conducting rails. What is the induced current I in the resistor?

(a) 30 μA
(b) 10 μA
(c) 20 μA
(d) No current flow



Q8 A single-phase voltage source square-wave inverter feeds pure inductive load. The waveform of the load current will be

(a) sinusoidal
(b) rectangular
(c) trapezoidal
(d) triangular

Q9 A thyristor controlled reactor is used to get

(a) variable resistance.
(b) variable capacitance.
(c) variable inductance.
(d) improved reactor power factor.

Q10 A causal system is always

(a) stable
(b) unstable
(c) may or may not be stable
(d) cannot be determined

Q11 When a bundled conductor is used in place of a single conductor, the changes in line parameters are:

(a) L increases and C decreases
(b) L decreases and C increases
(c) L decreases and C not affected
(d) L and C both unaffected

Q12 Normally ZBus matrix is a

(a) null matrix.
(b) sparse matrix.
(c) full matrix.
(d) unity matrix.

Q13 In load flow analysis, the load connected at a bus is represented as

(a) constant current drawn from the bus.
(b) constant impedance connected at the bus.
(c) voltage and frequency dependent source at the bus.
(d) constant real and reactive drawn from the bus.

Q14 One current transformer (CT) is mounted over a three-phase three-core cable with its after removing sheath and armour from the portion covered by the CT. The CT secondary would measure

(a) the positive sequence current.
(b) the zero sequence current.
(c) the negative sequence current.
(d) three times the zero sequence.

Q15 For a transmission line with losses, the characteristic impedance does not depend on

(a) the operating frequency of the line.
(b) length of the line
(c) the conductivity of the conductors.
(d) conductivity of the dielectric separating the conductors.

Q16 When a transformer primary is connected to line the zero sequence currents can flow from line into a transformer bank if the windings are in:

(a) delta/star.
(b) star/grounded star.
(c) grounded star/delta.
(d) delta/delta

Q17 The critical clearing time of a fault in power system is related to

(a) reactive power limit.
(b) short-circuit current limit.
(c) steady-state stability limit.
(d) transient stability limit.

Q18 In Merz Price percentage differential protection of a D-Y transformer, the CT secondaries connection in the primary and secondary windings of the transformer would be in the form

$$(a)\ D-Y\ (b)\ Y-D\ (c)\ D-D\ (d)\ Y-Y$$

Q19 The surge impedance of a three-phase, 400 kV transmission line is 400 Ω. The surge impedance loading (SIL) is

$$(a)\ 400\ MW\ (b)\ 1000\ MW\ (c)\ 1600\ MW\ (d)\ 800\ MW$$

Q20 The cost function of a 50 MW generator is given by $F(P) = 225 + 53P + 0.02P^2$ where P is the generator loading in MW. For 100% loading the incremental cost is:

(a) Rs. 56 per MW
(b) Rs. 55 per MW
(c) Rs. 58.5 per MW
(d) Rs. 59.5 per MW

Q21 A separately excited DC motor is required to be controlled from a three-phase source for operation in the first quadrant only. The most preferred converter would be

(a) fully-controlled converter.
(b) fully-controlled converter with freewheeling diode.
(c) half-controlled converter.
(d) sequence control of two series connected fully controlled converters.

Q22 An alternating voltage is given by v=200sin314t. Its average value will be

A) 141.42 V
B) 0 V
C) 127.27 V
D) 115.47 V

Q23 An alternating voltage is given by v=200sin314t. Its RMS value will be

A) 141.42 V
B) 0 V
C) 127.27 V
D) 115.47 V

Q24 The continuous time system described by $y(t) = sin(x(t))$ is

a) causal, linear and time variant
b) causal, linear and time invariant
c) causal, non-linear and time invariant
d) non-causal, non-linear and time invariant

Q25 The Fourier transform of rectangular pulse is

(a) impulse
(b) sinc function
(c) rectangular pulse
(d) triangular pulse

Q26 The Fourier series of a real periodic function has only

I. cosine terms if it is even
II. sine terms if it is even
III. cosine terms if it is odd
IV. sine terms if it is odd

Which of the above statements are correct?
(a) I and IV
(b) I and III
(c) II and IV
(d) II and III

Q27 A real signal x(t) has Fourier transform x(f). Which one of the following is correct?

(a) Magnitude of x(f) has even symmetry, while phase of x(f) has odd symmetry
(b) Magnitude of x(f) has odd symmetry, while phase of x(f) has even symmetry
(c) Both magnitude and phase of x(f) have even symmetry
(d) Both magnitude and phase of x(f) have odd symmetry

Q28 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.

Q29 A continuous time periodic signal x(t), having a period T, is convolved with itself. The resulting signal is

(a) not periodic.
(b) periodic with a period T.
(c) periodic having a period 2T.
(d) periodic having a period T/2.

Q30 During making connections, the current and potential coils of a wattmeter are accidentally interchanged. When the circuit is energised, the wattmeter does not show the reading. This is due to

(a) damage done to the potential coil.
(b) damage done to the current coil.
(c) damage done to both potential and current coil.
(d) loose connection.

Q31 If the load power factor is varied from high to low in case of a transformer, which of the following is true?

(a) Core losses and copper losses will remain unchanged
(b) Core loss increases
(c) Copper loss increases, core loss decreases
(d) None of these

Q32 A transformer on no load is switched on to an ac source of voltage. It will draw a current, which is

a) Same as steady state magnetising current
b) Several times as steady state magnetising current depending on the initial state of residual flux in the transformer core
c) Several times as steady state magnetising current independent of the initial state of residual flux in the transformer core
d) Twice the steady state magnetising current provided the core has no residual flux

Q33 Two transformers of identical voltages but different capacities are operating in parallel. For ideal load sharing

(a) impedances must be equal
(b) per unit impedances must be equal
(c) per unit impedances and X/R ratios must be equal
(d) impedances and X/R ratios must be equal

Q34 In a DC transmission line

a) it is necessary for the sending end and receiving end to be operated in synchronism.
b) the effects of inductive and capactive reactances are greater than in an AC transmission line of the same rating.
c) there are no effects due to inductive and capactive reactances.
d) power transfer capability is limited by stability considerations.

Q35 In Kelvin's double bridge, two sets of readings are taken by reversing the battery terminals. This is done to

(a) eliminate the effect of contact resistance.
(b) eliminate the effect of thermo-electric emfs.
(c) correct for changes in battery voltages.
(d) eliminate the effect of resistance of leads.

Q36 The current in primary winding of a current transformer depends on

(a) voltage and power factor of secondary winding.
(b) secondary winding current.
(c) load connected to the system in which CT is installed.
(d) any one of these.

Q37 A transformer has copper loss of 1.5% and reactance 3.5% when tested on load. Calculate its full load voltage regulation (%) at unity power factor.

(a) 1.50
(b) 3.32
(c) 0.83
(d) -0.83

Q38 If applied voltage of a certain transformer is increased by 50% and frequency is reduced to 50% (assuming magnetic circuits remain unsaturated), maximum core flux density will

(a) change to 3 times its original value
(b) change to 1.5 times its original value
(c) change to 0.5 times its original value
(d) remains same as before

Q39 A single-phase transformer has a rating of 15kVA, 600/120V. It is reconnected as an autotransformer to supply at 720V from a 600V primary source. Maximum load it can supply is

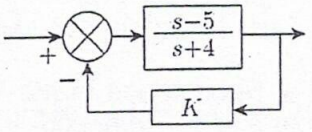
(a) 15kVA
(b) 18kVA
(c) 90kVA
(d) 12kVA

Q53 A control system is defined by the following relation: $x'' + 6x' + 10x = 24(1 - e^{-t})$. The final value of $x$is:

(a) 6
(b) 2
(c) 2.4
(d) -2

Q54 For what range of K is the system shown in the following figure, asymptotically stable

$$(a)K < 4\ (b)\ K > 5/4\ (c)\ K > 0\ (d)\ None\ of\ these$$



Q55 The Nyquist plot can be used to adjudge

(a) stability and transient response
(b) steady-state errors
(c) absolute as well as relative stability
(d) absolute as well as relative stability and number of closed-loop poles in right half of s-plane.

Q56 Unit step response of a system can be obtained from the unit impulse response by

(a) differentiating the impulse response
(b) integrating the impulse response
(c) multiplying the impulse response by $1 - e^{-t}$.
(d) none of these.

Q57 In a force-voltage analogy, the mass M, stiffness k and viscous friction f are equivalent to which of the following corresponding electrical quantities (in order) as

(a) R, L, C
(b) L, C, R
(c) C, L, R
(d) R, C, L

Q58 The open-loop DC gain of a unity negative feedback system with overall DC gain 2/3, is

(a) 1/2
(b) 2/5
(c) 3/2
(d) 2

Q59 The load carrying capability of a long AC transmission line is

(a) always limited by the conductor size.
(b) limited by stability consideration.
(c) reduced at low ambient temperatures.
(d) decreased by the use of bundled conductors of single conductors.

Q60 The use of high-speed circuit-breakers

(a) reduces the short circuit current.
(b) improves system stability.
(c) decreases system stability.
(d) increases the short circuit current.

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