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**Previous Year Paper**  
**25 Mar 2022 Paper VI**  
**(Advt. No. 02/19)**



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Question Booklet Series

Question Booklet

D

Paper—VI

# ELECTRICAL ENGINEERING

Time Allowed : 1 Hour

( Objective )

Maximum Marks : 100

Read the following instructions carefully before you begin to answer the questions.

## IMPORTANT INSTRUCTIONS

1. This Question Booklet contains 50 questions in all.
2. All questions carry equal marks.
3. Attempt all questions.
4. Immediately after commencement of the examination, you should check up your Question Booklet and ensure that the Question Booklet Series is printed on the top right-hand corner of the Booklet. The Booklet contains 7 printed pages and no page or question is missing or unprinted or torn or repeated. If you find any defect in this Booklet, get it replaced immediately by a complete Booklet of the same series.
5. You must write your Roll Number in the space provided on the top of this page. Do not write anything else on the Question Booklet.
6. An Answer Sheet will be supplied to you separately by the Invigilator to mark the answers. You must write your Name, Roll No. and other particulars on the first page of the Answer Sheet provided, failing which your Answer Sheet will not be evaluated.
7. You will encode your Roll Number and the Question Booklet Series A, B, C or D as it is printed on the top right-hand corner of this Question Booklet with Black/Blue ballpoint pen in the space provided on Page-2 of your Answer Sheet. If you do not encode or fail to encode the correct series of your Question Booklet, your Answer Sheet will not be evaluated correctly.
8. Questions and their responses are printed in English only in this Booklet. Each question comprises four responses—(A), (B), (C) and (D). You are to select ONLY ONE correct response and mark in your Answer Sheet. In case you feel that there are more than one correct response, mark the response which you consider the best. In any case, choose ONLY ONE response for each question. Your total marks will depend on the number of correct responses marked by you in the Answer Sheet.
9. In the Answer Sheet, there are four brackets—(A), (B), (C) and (D) against each question. To answer the questions you are to mark with Black/Blue ballpoint pen ONLY ONE bracket of your choice for each question. Select one response for each question in the Question Booklet and mark in the Answer Sheet. If you mark more than one answer for one question, the answer will be treated as wrong. Any erasure or change is not allowed.
10. You should not remove or tear off any sheet from the Question Booklet. You are not allowed to take this Question Booklet and the Answer Sheet out of the Examination Hall during the examination. After the examination has concluded, you must hand over your Answer Sheet to the Invigilator. Thereafter, you are permitted to take away the Question Booklet with you.
11. Failure to comply with any of the above instructions will render you liable to such action or penalty as the Commission may decide at their discretion.

SEAL

1. Which of the following motors is used in mixer-grinder?
  - (A) Repulsion motor
  - (B) Universal motor ✓
  - (C) Hysteresis motor
  - (D) Reluctance motor
2. In which single-phase motor, the rotor has no teeth or winding?
  - (A) Hysteresis motor ✓
  - (B) Reluctance motor
  - (C) Split-phase motor
  - (D) Universal motor
3. For moment of inertia to be small in two-phase servomotor, the ratio of rotor diameter to its length should be
  - (A) small ✓
  - (B) equal to 1
  - (C) large
  - (D) All of the above
4. The synchronous motor connected to an infinite bus takes power at a lagging power factor. If its excitation is increased, then the
  - (A) power factor increases
  - (B) load angle increases ✓
  - (C) terminal voltage increases
  - (D) None of the above
5. A synchronous motor, connected to an infinite bus, is working at a leading p.f. Its excitation e.m.f.  $E_f$  and alternator terminal voltage  $V_t$  are related as
  - (A)  $E_f > V_t$  and  $E_f$  leads  $V_t$
  - (B)  $E_f < V_t$  and  $E_f$  lags  $V_t$
  - (C)  $E_f > V_t$  and  $E_f$  lags  $V_t$  ✓
  - (D)  $E_f < V_t$  and  $E_f$  leads  $V_t$
6. The starting current of a three-phase induction motor is equal to three times the full-load current. If the full-load slip is 2%, then the starting torque as a percentage of full-load torque is
  - (A) 18% of full-load torque
  - (B) 6% of full-load torque ✓
  - (C) 36% of full-load torque
  - (D) None of the above
7. The insulation of modern EHV and UHV lines is designed based on
  - (A) corona
  - (B) switching voltage
  - (C) lightning voltage ✓
  - (D) radio interface
8. In a single-phase full-wave bridge circuit and in a three-phase, delta full-wave bridge circuit, what will be the ripple voltage frequency respectively?
  - (A) Both will be twice the line frequency
  - (B) Both will be six times the line frequency
  - (C) Twice the line frequency, six times the line frequency ✓
  - (D) None of the above



9. The material used for fuse must have
  - (A) low melting point and high specific resistance
  - (B) high melting point and low specific resistance
  - (C) low melting point and any specific resistance
  - (D) low melting point and low specific resistance
10. Consider three transformers in  $\Delta$ - $\Delta$ , supplying their rated load. If one transformer is removed, then each of the remaining two transformers is overloaded. The overload on each transformer is given as
  - (A) 1
  - (B) 1.732
  - (C) 1.232
  - (D) 1.872
11. The most familiar application of zigzag transformer is
  - (A) converting single-phase to two-phase
  - (B) as ground reference on an ungrounded system
  - (C) reducing harmonics
  - (D) All of the above
12. In Scott connection, the voltage across the teaser leads the mains by
  - (A)  $120^\circ$
  - (B)  $90^\circ$
  - (C)  $60^\circ$
  - (D)  $30^\circ$
13. Scott connection is used for the conversion of
  - (A) single-phase to three-phase
  - (B) single-phase to two-phase
  - (C) three-phase to two-phase
  - (D) All of the above
14. The Buchholz relay protects a transformer from
  - (A) turn-to-turn fault
  - (B) all types of internal faults
  - (C) winding-to-winding fault
  - (D) None of the above
15. For a consumer, what is the most economical power factor?
  - (A) 0.25–0.5 leading
  - (B) 0.25–0.5 lagging
  - (C) 0.85–0.95 leading
  - (D) 0.85–0.95 lagging
16. Which among the following happens in a low power factor?
  - (A) Large kVA rating of the equipment
  - (B) Greater conductor size
  - (C) Reduced handling capacity of the system
  - (D) All of the above
17. For complete protection of a three-phase line
  - (A) three phase and three earth fault relays are required
  - (B) three phase and two earth fault relays are required
  - (C) two phase and one earth fault relays are required
  - (D) one phase and two earth fault relays are required
18. For a 500 Hz frequency excitation, a 50 km long power line will be modelled as
  - (A) Data insufficient
  - (B) short line
  - (C) medium line
  - (D) long line

19. Which of the following statements is true?
- The zero sequence reactance of a transformer is approximately equal to the negative sequence reactance.
  - The zero sequence reactance of a transformer is approximately equal to the positive sequence reactance.
  - The zero sequence reactance is larger than the negative sequence reactance, but less than the positive sequence reactance in the transformer.
  - The zero sequence reactance depends upon the connection and winding of the transformer.
20. A long overhead transmission line is terminated by its characteristic impedance. Under this operating condition, the ratio of voltage to current at different points along the line will
- remain same at the two ends, but be higher between the two ends being maximum at the centre of the line
  - remain same at all points
  - progressively increase from the sending end to the receiving end
  - progressively increase from the receiving end to the sending end
21. The ROC of a system is the
- range in which the signal is free of noise
  - range of frequency for which the z-transform exists
  - range of frequency for which the signal gets transmitted
  - range of  $z$  for which the z-transform converges
22. Consider the following statements with respect to feedback of the control systems :
- The feedback can improve stability or be harmful to stability if it is not properly applied.
  - The feedback can always improve stability.
  - In many situations, the feedback can reduce the effect of noise and disturbance on system performance.
  - In general, the sensitivity of the system gain of a feedback system of a parameter variation depends on where the parameter is located.
- Select the correct statements.
- 1, 2 and 3 only
  - 1, 2 and 4 only
  - 1, 3 and 4 only
  - 1, 2, 3 and 4

23. Closed-loop system has higher \_\_\_\_\_ than open-loop control system and this implies increased speed of response.  
(A) gain (B) speed  
(C) frequency (D) bandwidth
24. The polar plot of the transfer function  
 $G(s) = 10(s+1)/(s+10)$   
will be in the  
(A) fourth quadrant  
(B) third quadrant  
(C) second quadrant  
(D) first quadrant
25. If a signal is passed through an integrator, it \_\_\_\_\_ the amplitude of noise signal.  
(A) enhances (B) factorizes  
(C) stabilizes (D) reduces
26. Assertion (I) :  
All the systems which exhibit overshoot in transient response will also exhibit resonance peak in frequency response.  
Reason (II) :  
Large resonance peak in frequency response corresponds to a large overshoot in transient response.  
Select the correct choice.  
(A) Both I and II are true, but II is not the correct explanation of I  
(B) Both I and II are true and II is the correct explanation of I  
(C) I is true but II is false  
(D) I is false but II is true
27. The similarity between the Fourier transform and the z-transform is that  
(A) both convert digital signal to analog signal  
(B) both convert discrete time domain to frequency spectrum domain  
(C) both convert analog signal to digital signal  
(D) both convert frequency spectrum domain to discrete time domain
28. How many AND gates are required for a 1-to-8 multiplexer?  
(A) 2 (B) 6  
(C) 5 (D) 8
29. A digital measuring instrument employs a sampling rate of 100 samples/second. The sampled input  $x(n)$  is averaged using the difference equation  
$$Y(n) = [x(n) + x(n-1) + x(n-2) + x(n-3)] / 4$$
  
For a step input, the maximum time taken for the output to reach the final value after the input transition is  
(A) 40 ms (B) 20 ms  
(C) 80 ms (D)  $\infty$
30. Which of the following contributes to harmonic distortion in amplifiers?  
(A) Defective active device  
(B) Non-linearity in active device  
(C) Presence of noise  
(D) Positive feedback



31. In PD controller, the derivative action plays a significant role in increasing \_\_\_\_\_ of response.  
(A) time  
(B) distance  
(C) volume  
(D) speed
32. In cascade form of realization, how many bits should be used to represent the FIR filter coefficients in order to avoid the quantization effect on filter coefficients?  
(A) 28 to 40  
(B) 5 to 10  
(C) 20 to 24  
(D) 12 to 14
33. Decimation is a process in which the sampling rate is  
(A) reduced  
(B) stable  
(C) enhanced  
(D) unpredictable
34. The antenna used for sending back signals to the earth is  
(A) Yagi antenna  
(B) dipole antenna  
(C) chicken-mesh antenna  
(D) horn antenna
35. Which of the following filters exhibits/exhibit its/their dependency upon the system design for the stability purpose?  
(A) IIR  
(B) FIR  
(C) Both (A) and (B)  
(D) None of the above
36. The commercial FM radio broadcast band is  
(A) 20 to 80 kHz  
(B) 535 to 1600 kHz  
(C) 88 to 108 MHz  
(D) 300 to 3000 MHz
37. In FIR filter design, which among the following parameters is/are separately controlled by using Kaiser window?  
(A) Order of filter ( $M$ )  
(B) Transition width of main lobe  
(C) Both (A) and (B)  
(D) None of the above
38. FIR filters  
1. are non-recursive  
2. use feedback  
3. are recursive  
4. do not adopt any feedback  
Select the correct choice.  
(A) 1 and 2  
(B) 3 and 4  
(C) 1 and 4  
(D) 2 and 3
39. In DSP, which among the following maintains the track of addresses of input data as well as the coefficients stored in data and program memories?  
(A) Program sequence  
(B) Barrel shifter  
(C) MAC  
(D) Data address generator



40. Which of the following computer languages is used for artificial intelligence?  
(A) PROLOG (B) C  
(C) FORTRAN (D) COBOL
41. The device that performs signal conversion is  
(A) plotter  
(B) modem  
(C) keyboard  
(D) modulator
42. Which of the following is the coding of data so that it cannot be easily understood if intercepted?  
(A) Barcode  
(B) Decoder  
(C) Mnemonics  
(D) Encryption
43. An IC contains 50 gates, each of which consists of 6 components. It belongs to  
(A) VLSI (B) MSI  
(C) LSI (D) SSI
44. The first computer made available for commercial use was  
(A) UNIVAC (B) ENIAC  
(C) EDSAC (D) Mark-I
45. A compiler means  
(A) a person who compiles source programs  
(B) the same thing as a programmer  
(C) a program which translates source program into object program  
(D) keypunch operator
46. Which of the following parts interprets program instructions and initiates control operations?  
(A) Control unit  
(B) Storage unit  
(C) Logic unit  
(D) Input
47. A memory that does not change its contents without external causes is known as  
(A) dynamic memory  
(B) RAM  
(C) static memory  
(D) EEPROM
48. Stack is also known as  
(A) FIFO memory  
(B) flash memory  
(C) LIFO memory  
(D) LIFO memory
49. If the torque of the induction motor decreases, then the  
(A) speed of the rotor decreases  
(B) speed of the rotor increases  
(C) current of the rotor decreases  
(D) power of the motor decreases
50. The direction of rotation of universal motor can be reversed by reversing the flow of current through  
(A) armature winding only  
(B) armature winding or field winding  
(C) field winding only  
(D) None of the above

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