Roll No. .....

Question Booklet Number

O. M. R. Serial No.

M. Sc. (Electronics) (Fourth Semester)
(NEP) EXAMINATION, 2025-26
POWER ELECTRONICS (ELECTIVE)

Paper Code							
B	1	4	1	0	0	4	T

Questions Booklet Series
D

Time : 1:30 Hours] [*Maximum Marks : 75*

Instructions to the Examinee :

1. Do not open the booklet unless you are asked to do so.

2. The booklet contains 100 questions. Examinee is required to answer 75 questions in the OMR Answer-Sheet provided and not in the question booklet. All questions carry equal marks.

3. Examine the Booklet and the OMR Answer-Sheet very carefully before you proceed. Faulty question booklet due to missing or duplicate pages/questions or having any other discrepancy should be got immediately replaced.

परीक्षार्थियों के लिए निर्देश :

1. प्रश्न-पुस्तिका को तब तक न खोलें जब तक आपसे कहा न जाए।

2. प्रश्न-पुस्तिका में 100 प्रश्न हैं। परीक्षार्थी को 75 प्रश्नों को केवल दी गई OMR आन्सर-शीट पर ही हल करना है, प्रश्न-पुस्तिका पर नहीं। सभी प्रश्नों के अंक समान हैं।

3. प्रश्नों के उत्तर अंकित करने से पूर्व प्रश्न-पुस्तिका तथा OMR आन्सर-शीट को सावधानीपूर्वक देख लें। दोषपूर्ण प्रश्न-पुस्तिका जिसमें कुछ भाग छपने से छूट गए हों या प्रश्न एक से अधिक बार छप गए हों या उसमें किसी अन्य प्रकार की कमी हो, तो उसे तुरन्त बदल लें।

(Remaining instructions on the last page) **(शेष निर्देश अन्तिम पृष्ठ पर)**

(Only for Rough Work)

1. Firing angle (α) is :

(A) Conduction angle

(B) Delay in triggering SCR

(C) Output voltage

(D) Input frequency

2. Output of half-wave controlled rectifier is :

(A) Pure DC

(B) Pulsating DC

(C) AC

(D) Zero

3. A single-phase half-wave controlled rectifier uses :

(A) Diode

(B) SCR

(C) MOSFET

(D) IGBT

4. Based on quadrant operation, choppers are :

(A) Type A to Type E

(B) Type 1 to Type 3

(C) Class I to II

(D) None of the above

5. Type A chopper operates in :

(A) First quadrant

(B) Second quadrant

(C) Third quadrant

(D) Fourth quadrant

6. Type B chopper operates in :

(A) First quadrant

(B) Second quadrant

(C) Third quadrant

(D) Fourth quadrant

7. Type C chopper is combination of :

(A) Type A and B

(B) Type B and D

(C) Type A and D

(D) Type C and D

8. Type D chopper operates in :

(A) First and second quadrant

(B) First and fourth quadrant

(C) All quadrants

(D) Only one quadrant

9. In step-up chopper, energy is stored in :

(A) Capacitor

(B) Resistor

(C) Inductor

(D) Diode

10. When duty cycle increases in boost converter :

(A) Output decreases

(B) Output increases

(C) Output constant

(D) Output zero

11. Output voltage of step-up chopper is :

(A) Less than input

(B) Equal to input

(C) Greater than input

(D) Zero

12. Type E chopper operates in :

(A) One quadrant

(B) Two quadrants

(C) Three quadrants

(D) Four quadrants

13. Energy stored in inductor is :

(A) Dissipated instantly

(B) Returned to source

(C) Maintained through free-wheeling path

(D) Lost

14. When switch is OFF in RL load :

(A) Current becomes zero instantly

(B) Current flows through diode

(C) Voltage becomes zero

(D) Power stops

15. Freewheeling diode is used to :

(A) Increase voltage

(B) Maintain current continuity

(C) Reduce frequency

(D) Increase power

16. In RL load, current is :

(A) Discontinuous always

(B) Continuous due to inductance

(C) Zero

(D) Infinite

17. In step-down chopper, switch is :

(A) Always ON

(B) Always OFF

(C) Periodically ON and OFF

(D) Never ON

18. If duty cycle increases, output voltage :

(A) Decreases

(B) Increases

(C) Remains same

(D) Becomes zero

19. Output voltage of step-down chopper is :

(A) Greater than input

(B) Equal to input

(C) Less than input

(D) Zero

20. Choppers are classified based on :

(A) Voltage

(B) Current

(C) Quadrant operation

(D) Frequency

21. Duty cycle (D) is defined as :

(A) OFF time/Total time

(B) ON time/Total time

(C) ON time/OFF time

(D) Frequency × time

22. Time ratio control in chopper refers to :

(A) Voltage ratio

(B) Frequency ratio

(C) Duty cycle control

(D) Power ratio

23. Chopper operation is based on :

(A) Linear control

(B) Switching principle

(C) Amplification

(D) Filtering

24. Choppers are also called :

(A) Inverters

(B) DC transformers

(C) Rectifiers

(D) Cycloconverters

25. A chopper is a/an :

(A) AC to DC converter

(B) DC to AC converter

(C) DC to DC converter

(D) AC to AC converter

26. IGBT combines :

(A) MOSFET + BJT

(B) SCR + MOSFET

(C) BJT + SCR

(D) MOSFET + DIAC

27. MOSFET is :

(A) Current controlled

(B) Voltage controlled

(C) Temperature controlled

(D) Frequency controlled

28. Commutation means :

(A) Turning ON

(B) Turning OFF

(C) Voltage control

(D) Current control

29. Parallel operation is used for :

(A) Increasing voltage

(B) Increasing current

(C) Reducing current

(D) Reducing voltage

30. Series operation is used for :

(A) Increasing current

(B) Increasing voltage rating

(C) Reducing power

(D) Increasing frequency

31. *dv*/*dt* protection is provided by :

(A) Resistor

(B) Capacitor

(C) RC snubber

(D) Inductor

32. MCT stands for :

(A) MOS Controlled Thyristor

(B) Metal Controlled Transistor

(C) Main Control Thyristor

(D) Multi Channel Transistor

33. TRIAC is equivalent to :

(A) Two SCRs in series

(B) Two SCRs in parallel (opposite direction)

(C) One MOSFET

(D) One diode

34. TRIAC conducts in :

(A) One direction

(B) Two directions

(C) Three directions

(D) No direction

35. GTO can be turned OFF by :

(A) Removing voltage

(B) Gate signal

(C) Reverse bias

(D) Temperature

36. GTO stands for :

(A) Gate Turn-Off Thyristor

(B) Gate Triggered Oscillator

(C) General Turn-On

(D) Gate Timing Operation

37. Most common method of turn-on :

(A) Thermal

(B) Light

(C) Gate triggering

(D) dv/dt

38. SCR can be turned ON by :

(A) Gate triggering

(B) Forward breakover

(C) dv/dt triggering

(D) All of the above

39. In two-transistor analogy :

(A) Both are NPN

(B) Both are PNP

(C) One PNP and one NPN

(D) Both MOSFET

40. SCR can be represented as :

(A) One transistor

(B) Two transistors

(C) Three diodes

(D) Four resistors

41. Latching current is :

(A) Current to turn OFF

(B) Current just after triggering

(C) Maximum current

(D) Leakage current

42. Holding current is :

(A) Current to turn ON

(B) Minimum current to keep ON

(C) Maximum current

(D) Leakage current

43. Forward blocking region occurs when :

(A) Gate current applied

(B) Device ON

(C) Anode positive, no gate signal

(D) Reverse biased

44. SCR has how many operating regions ?

(A) 2

(B) 3

(C) 4

(D) 5

45. Static characteristics represent :

(A) Switching behavior

(B) Steady-state V-I relationship

(C) Transient response

(D) Losses

46. SCR symbol contains :

(A) Anode, Cathode

(B) Gate, Cathode

(C) Anode, Cathode, Gate

(D) Base, Collector, Emitter

47. Number of layers in SCR :

(A) 2

(B) 3

(C) 4

(D) 5

48. SCR belongs to which family ?

(A) Transistor

(B) Thyristor

(C) Diode

(D) MOS device

49. A thyristor is :

(A) Voltage controlled device

(B) Current controlled device

(C) Light controlled device

(D) Temperature controlled device

50. Which device is a unidirectional power semiconductor device ?

(A) TRIAC

(B) DIAC

(C) SCR

(D) MOSFET

51. Output voltage of a cycloconverter depends on :

(A) Frequency only

(B) Input voltage only

(C) Firing angle (α)

(D) Load resistance only

52. Load commutated cycloconverter operation depends on :

(A) Voltage only

(B) Current waveform

(C) Frequency only

(D) Resistance

53. Load commutated cycloconverter is :

(A) Forced commutated converter

(B) Naturally commutated converter using load

(C) DC converter

(D) Inverter only

54. Number of converters in basic cycloconverter is :

(A) One

(B) Two (positive and negative)

(C) Three

(D) Four

55. Cycloconverter control is achieved by :

(A) Frequency variation

(B) Firing angle control

(C) Voltage change

(D) Current change

56. Cycloconverter directly converts :

(A) AC to DC to AC

(B) AC to AC without DC link

(C) DC to AC

(D) AC to DC

57. Three-Phase Half-Wave Cyclo-converter Number of SCRs used :

(A) 3

(B) 6

(C) 9

(D) 12

58. Step-down cycloconverter :

(A) Increases frequency

(B) Decreases frequency

(C) Keeps constant frequency

(D) Produces DC

59. Single-phase cycloconverter uses :

(A) One converter

(B) Two converters (positive and negative group)

(C) Three converters

(D) Four converters

60. Cycloconverters are mainly used for :

(A) High-frequency applications

(B) Low-frequency, high-power applications

(C) Signal processing

(D) Logic circuits

61. A cycloconverter converts :

(A) AC to DC

(B) DC to AC

(C) AC to AC (different frequency)

(D) DC to DC

62. Main disadvantage of AC voltage controllers is :

(A) High cost

(B) Harmonics and poor power factor

(C) Complex design

(D) High efficiency

63. In 3-phase controller, power factor is :

(A) Unity

(B) Leading

(C) Lagging

(D) Zero

64. Increasing firing angle causes :

(A) Increase RMS voltage

(B) Decrease RMS voltage

(C) No change

(D) Infinite voltage

65. AC voltage controllers are widely used in :

(A) Heating control

(B) DC motors

(C) Battery charging

(D) Rectifiers

66. Phase angle control introduces :

(A) Pure waveform

(B) Harmonics

(C) DC output

(D) Zero distortion

67. Three-phase controller's advantage is :

(A) High ripple

(B) Low ripple

(C) Low efficiency

(D) High distortion

68. AC voltage controller control is :

(A) Stepwise

(B) Continuous (phase control)

(C) No control

(D) Frequency control

69. Tap changer control is :

(A) Continuous

(B) Stepwise

(C) Random

(D) Sinusoidal

70. In three-phase controller, conduction is :

(A) Continuous

(B) Controlled by firing angle

(C) Always full cycle

(D) Random

71. Sinusoidal voltage controller controls :

(A) Frequency

(B) RMS voltage

(C) DC voltage

(D) Current only

72. Tap changing is done by :

(A) Switching taps on winding

(B) Changing frequency

(C) Using SCR

(D) Using capacitor

73. Tap changer provides :

(A) Continuous voltage control

(B) Step-wise voltage control

(C) No control

(D) Random voltage

74. A transformer tap changer is used to :

(A) Change frequency

(B) Change voltage level

(C) Change current only

(D) Change power factor

75. Main disadvantage of AC voltage controller is :

(A) Low cost

(B) Harmonics and poor power factor

(C) Simple circuit

(D) High efficiency

76. Harmonics in integral cycle control are :

(A) High

(B) Moderate

(C) Low

(D) Zero

77. In integral cycle control :

(A) Part of each cycle is controlled

(B) Whole cycles are switched ON and OFF

(C) Voltage is constant

(D) Current is constant

78. AC voltage controllers mainly use :

(A) Diodes

(B) SCRs or TRIACs

(C) BJTs

(D) MOSFETs only

79. AC voltage controllers are also known as :

(A) Rectifiers

(B) Inverters

(C) AC regulators

(D) Choppers

80. AC voltage controllers are used to control :

(A) Frequency

(B) RMS value of AC voltage

(C) Power factor only

(D) Current only

81. In 3-phase full converter, two SCRs conduct at a time.

(A) Yes

(B) No

(C) Only one

(D) Three

82. A three-phase half-controlled converter uses :

(A) 6 SCRs

(B) 3 SCRSs + 3 diodes

(C) 4 SCRs

(D) 2 SCRs

83. A three-phase fully controlled bridge converter uses :

(A) 3 SCRs

(B) 4 SCRs

(C) 6 SCRs

(D) 2 SCRs

84. Main advantage of dual converter :

(A) High ripple

(B) Bidirectional power flow

(C) Low efficiency

(D) Complex design

85. In dual converter :

(A) Both converters operate simultaneously

(B) Only one converter operates

(C) No converter works

(D) Random operation

86. Circulating current is controlled by :

(A) Inductor

(B) Capacitor

(C) Resistor

(D) Transformer

87. Dual converter operation modes :

(A) One quadrant

(B) Two quadrant

(C) Circulating and non-circulating current

(D) None of the above

88. Dual converter consists of :

(A) One converter

(B) Two converters

(C) Three converters

(D) Four converters

89. Overlap angle reduces :

(A) Current

(B) Voltage

(C) Frequency

(D) Power

90. Converter operates as inverter when :

(A) $\alpha = 0°$

(B) $\alpha < 90°$

(C) $\alpha > 90°$

(D) $\alpha = 90°$

91. Maximum output voltage occurs at :

(A) $\alpha = 0°$

(B) $\alpha = 90°$

(C) $\alpha = 180°$

(D) $\alpha = 45°$

92. Output voltage of a fully controlled converter depends on :

(A) Input voltage only

(B) Load resistance

(C) Firing angle (α)

(D) Frequency

93. A single-phase fully controlled bridge converter uses :

(A) 2 diodes

(B) 2 SCRs

(C) 4 SCRs

(D) 4 diodes

94. Freewheeling diode reduces :

(A) dv/dt

(B) di/dt stress

(C) Both dv/dt and di/dt

(D) None of the above

95. With freewheeling diode, current waveform becomes :

(A) Discontinuous

(B) Smooth

(C) Zero

(D) Sinusoidal

96. When SCR turns OFF, freewheeling diode :

(A) Blocks current

(B) Conducts

(C) Increases voltage

(D) Stops current

97. Freewheeling diode is connected :

(A) In series with load

(B) In parallel across load

(C) Across supply

(D) In gate circuit

98. Efficiency of half-wave rectifier is :

(A) High

(B) Low

(C) Zero

(D) Infinite

99. Without freewheeling diode, RL load causes :

(A) Smooth output

(B) Negative voltage

(C) Zero current

(D) Constant voltage

100. Freewheeling diode is used to :

(A) Increase voltage

(B) Reduce ripple

(C) Maintain current continuity

(D) Increase current

(Only for Rough Work)

4. Four alternative answers are mentioned for each question as—A, B, C & D in the booklet. The candidate has to choose the correct answer and mark the same in the OMR Answer-Sheet as per the direction :

Example :

Question :

Q. 1 (A) ● (C) (D)
Q. 2 (A) (B) ● (D)
Q. 3 (A) ● (C) (D)

Illegible answers with cutting and over-writing or half filled circle will be cancelled.

5. Each question carries equal marks. Marks will be awarded according to the number of correct answers you have.
6. All answers are to be given on OMR Answer Sheet only. Answers given anywhere other than the place specified in the answer sheet will not be considered valid.
7. Before writing anything on the OMR Answer Sheet, all the instructions given in it should be read carefully.
8. After the completion of the examination candidates should leave the examination hall only after providing their OMR Answer Sheet to the invigilator. Candidate can carry their Question Booklet.
9. There will be no negative marking.
10. Rough work, if any, should be done on the blank pages provided for the purpose in the booklet.
11. To bring and use of log-book, calculator, pager and cellular phone in examination hall is prohibited.
12. In case of any difference found in English and Hindi version of the question, the English version of the question will be held authentic.

Impt. : On opening the question booklet, first check that all the pages of the question booklet are printed properly. If there is any discrepancy in the question Booklet, then after showing it to the invigilator, get another question Booklet of the same series.

4. प्रश्न-पुस्तिका में प्रत्येक प्रश्न के चार सम्भावित उत्तर—A, B, C एवं D हैं। परीक्षार्थी को उन चारों विकल्पों में से सही उत्तर छाँटना है। उत्तर को OMR आन्सर-शीट में सम्बन्धित प्रश्न संख्या में निम्न प्रकार भरना है :

उदाहरण :

प्रश्न :

प्रश्न 1 (A) ● (C) (D)
प्रश्न 2 (A) (B) ● (D)
प्रश्न 3 (A) ● (C) (D)

अपठनीय उत्तर या ऐसे उत्तर जिन्हें काटा या बदला गया है, या गोले में आधा भरकर दिया गया, उन्हें निरस्त कर दिया जाएगा।

5. प्रत्येक प्रश्न के अंक समान हैं। आपके जितने उत्तर सही होंगे, उन्हीं के अनुसार अंक प्रदान किये जायेंगे।
6. सभी उत्तर केवल ओ. एम. आर. उत्तर-पत्रक (OMR Answer Sheet) पर ही दिये जाने हैं। उत्तर-पत्रक में निर्धारित स्थान के अलावा अन्यत्र कहीं पर दिया गया उत्तर मान्य नहीं होगा।
7. ओ. एम. आर. उत्तर-पत्रक (OMR Answer Sheet) पर कुछ भी लिखने से पूर्व उसमें दिये गये सभी अनुदेशों को सावधानीपूर्वक पढ़ लिया जाये।
8. परीक्षा समाप्ति के उपरान्त परीक्षार्थी कक्ष निरीक्षक को अपनी OMR Answer Sheet उपलब्ध कराने के बाद ही परीक्षा कक्ष से प्रस्थान करें। परीक्षार्थी अपने साथ प्रश्न-पुस्तिका ले जा सकते हैं।
9. निगेटिव मार्किंग नहीं है।
10. कोई भी रफ कार्य, प्रश्न-पुस्तिका के अन्त में, रफ-कार्य के लिए दिए खाली पेज पर ही किया जाना चाहिए।
11. परीक्षा-कक्ष में लॉग-बुक, कैलकुलेटर, पेजर तथा सेल्युलर फोन ले जाना तथा उसका उपयोग करना वर्जित है।
12. प्रश्न के हिन्दी एवं अंग्रेजी रूपान्तरण में भिन्नता होने की दशा में प्रश्न का अंग्रेजी रूपान्तरण ही मान्य होगा।

महत्वपूर्ण : प्रश्नपुस्तिका खोलने पर प्रथमतः जाँच कर देख लें कि प्रश्न-पुस्तिका के सभी पृष्ठ भलीभाँति छपे हुए हैं। यदि प्रश्नपुस्तिका में कोई कमी हो, तो कक्षनिरीक्षक को दिखाकर उसी सिरीज की दूसरी प्रश्न-पुस्तिका प्राप्त कर लें।