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
B

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. Freewheeling diode is used to :

(A) Increase voltage

(B) Reduce ripple

(C) Maintain current continuity

(D) Increase current

2. Without freewheeling diode, RL load causes :

(A) Smooth output

(B) Negative voltage

(C) Zero current

(D) Constant voltage

3. Efficiency of half-wave rectifier is :

(A) High

(B) Low

(C) Zero

(D) Infinite

4. Freewheeling diode is connected :

(A) In series with load

(B) In parallel across load

(C) Across supply

(D) In gate circuit

5. When SCR turns OFF, freewheeling diode :

(A) Blocks current

(B) Conducts

(C) Increases voltage

(D) Stops current

6. With freewheeling diode, current waveform becomes :

(A) Discontinuous

(B) Smooth

(C) Zero

(D) Sinusoidal

7. Freewheeling diode reduces :

(A) dv/dt

(B) di/dt stress

(C) Both dv/dt and di/dt

(D) None of the above

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

(A) 2 diodes

(B) 2 SCRs

(C) 4 SCRs

(D) 4 diodes

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

(A) Input voltage only

(B) Load resistance

(C) Firing angle (α)

(D) Frequency

10. Maximum output voltage occurs at :

(A) $\alpha = 0°$

(B) $\alpha = 90°$

(C) $\alpha = 180°$

(D) $\alpha = 45°$

11. Converter operates as inverter when :

(A) $\alpha = 0°$

(B) $\alpha < 90°$

(C) $\alpha > 90°$

(D) $\alpha = 90°$

12. Overlap angle reduces :

(A) Current

(B) Voltage

(C) Frequency

(D) Power

13. Dual converter consists of :

(A) One converter

(B) Two converters

(C) Three converters

(D) Four converters

14. Dual converter operation modes :

(A) One quadrant

(B) Two quadrant

(C) Circulating and non-circulating current

(D) None of the above

15. Circulating current is controlled by :

(A) Inductor

(B) Capacitor

(C) Resistor

(D) Transformer

16. In dual converter :

(A) Both converters operate simultaneously

(B) Only one converter operates

(C) No converter works

(D) Random operation

17. Main advantage of dual converter :

(A) High ripple

(B) Bidirectional power flow

(C) Low efficiency

(D) Complex design

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

(A) 3 SCRs

(B) 4 SCRs

(C) 6 SCRs

(D) 2 SCRs

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

(A) 6 SCRs

(B) 3 SCRSs + 3 diodes

(C) 4 SCRs

(D) 2 SCRs

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

(A) Yes

(B) No

(C) Only one

(D) Three

21. AC voltage controllers are used to control :

(A) Frequency

(B) RMS value of AC voltage

(C) Power factor only

(D) Current only

22. AC voltage controllers are also known as :

(A) Rectifiers

(B) Inverters

(C) AC regulators

(D) Choppers

23. AC voltage controllers mainly use :

(A) Diodes

(B) SCRs or TRIACs

(C) BJTs

(D) MOSFETs only

24. 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

25. Harmonics in integral cycle control are :

(A) High

(B) Moderate

(C) Low

(D) Zero

26. Main disadvantage of AC voltage controller is :

(A) Low cost

(B) Harmonics and poor power factor

(C) Simple circuit

(D) High efficiency

27. A transformer tap changer is used to :

(A) Change frequency

(B) Change voltage level

(C) Change current only

(D) Change power factor

28. Tap changer provides :

(A) Continuous voltage control

(B) Step-wise voltage control

(C) No control

(D) Random voltage

29. Tap changing is done by :

(A) Switching taps on winding

(B) Changing frequency

(C) Using SCR

(D) Using capacitor

30. Sinusoidal voltage controller controls :

(A) Frequency

(B) RMS voltage

(C) DC voltage

(D) Current only

31. In three-phase controller, conduction is :

(A) Continuous

(B) Controlled by firing angle

(C) Always full cycle

(D) Random

32. Tap changer control is :

(A) Continuous

(B) Stepwise

(C) Random

(D) Sinusoidal

33. AC voltage controller control is :

(A) Stepwise

(B) Continuous (phase control)

(C) No control

(D) Frequency control

34. Three-phase controller's advantage is :

(A) High ripple

(B) Low ripple

(C) Low efficiency

(D) High distortion

35. Phase angle control introduces :

(A) Pure waveform

(B) Harmonics

(C) DC output

(D) Zero distortion

36. AC voltage controllers are widely used in :

(A) Heating control

(B) DC motors

(C) Battery charging

(D) Rectifiers

37. Increasing firing angle causes :

(A) Increase RMS voltage

(B) Decrease RMS voltage

(C) No change

(D) Infinite voltage

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

(A) Unity

(B) Leading

(C) Lagging

(D) Zero

39. Main disadvantage of AC voltage controllers is :

(A) High cost

(B) Harmonics and poor power factor

(C) Complex design

(D) High efficiency

40. A cycloconverter converts :

(A) AC to DC

(B) DC to AC

(C) AC to AC (different frequency)

(D) DC to DC

41. Cycloconverters are mainly used for :

(A) High-frequency applications

(B) Low-frequency, high-power applications

(C) Signal processing

(D) Logic circuits

42. Single-phase cycloconverter uses :

(A) One converter

(B) Two converters (positive and negative group)

(C) Three converters

(D) Four converters

43. Step-down cycloconverter :

(A) Increases frequency

(B) Decreases frequency

(C) Keeps constant frequency

(D) Produces DC

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

(A) 3

(B) 6

(C) 9

(D) 12

45. Cycloconverter directly converts :

(A) AC to DC to AC

(B) AC to AC without DC link

(C) DC to AC

(D) AC to DC

46. Cycloconverter control is achieved by :

(A) Frequency variation

(B) Firing angle control

(C) Voltage change

(D) Current change

47. Number of converters in basic cycloconverter is :

(A) One

(B) Two (positive and negative)

(C) Three

(D) Four

48. Load commutated cycloconverter is :

(A) Forced commutated converter

(B) Naturally commutated converter using load

(C) DC converter

(D) Inverter only

49. Load commutated cycloconverter operation depends on :

(A) Voltage only

(B) Current waveform

(C) Frequency only

(D) Resistance

50. Output voltage of a cycloconverter depends on :

(A) Frequency only

(B) Input voltage only

(C) Firing angle (α)

(D) Load resistance only

51. Which device is a unidirectional power semiconductor device ?

(A) TRIAC

(B) DIAC

(C) SCR

(D) MOSFET

52. A thyristor is :

(A) Voltage controlled device

(B) Current controlled device

(C) Light controlled device

(D) Temperature controlled device

53. SCR belongs to which family ?

(A) Transistor

(B) Thyristor

(C) Diode

(D) MOS device

54. Number of layers in SCR :

(A) 2

(B) 3

(C) 4

(D) 5

55. SCR symbol contains :

(A) Anode, Cathode

(B) Gate, Cathode

(C) Anode, Cathode, Gate

(D) Base, Collector, Emitter

56. Static characteristics represent :

(A) Switching behavior

(B) Steady-state V-I relationship

(C) Transient response

(D) Losses

57. SCR has how many operating regions ?

(A) 2

(B) 3

(C) 4

(D) 5

58. Forward blocking region occurs when :

(A) Gate current applied

(B) Device ON

(C) Anode positive, no gate signal

(D) Reverse biased

59. Holding current is :

(A) Current to turn ON

(B) Minimum current to keep ON

(C) Maximum current

(D) Leakage current

60. Latching current is :

(A) Current to turn OFF

(B) Current just after triggering

(C) Maximum current

(D) Leakage current

61. SCR can be represented as :

(A) One transistor

(B) Two transistors

(C) Three diodes

(D) Four resistors

62. In two-transistor analogy :

(A) Both are NPN

(B) Both are PNP

(C) One PNP and one NPN

(D) Both MOSFET

63. SCR can be turned ON by :

(A) Gate triggering

(B) Forward breakover

(C) *dv*/*dt* triggering

(D) All of the above

64. Most common method of turn-on :

(A) Thermal

(B) Light

(C) Gate triggering

(D) *dv*/*dt*

65. GTO stands for :

(A) Gate Turn-Off Thyristor

(B) Gate Triggered Oscillator

(C) General Turn-On

(D) Gate Timing Operation

66. GTO can be turned OFF by :

(A) Removing voltage

(B) Gate signal

(C) Reverse bias

(D) Temperature

67. TRIAC conducts in :

(A) One direction

(B) Two directions

(C) Three directions

(D) No direction

68. TRIAC is equivalent to :

(A) Two SCRs in series

(B) Two SCRs in parallel (opposite direction)

(C) One MOSFET

(D) One diode

69. MCT stands for :

(A) MOS Controlled Thyristor

(B) Metal Controlled Transistor

(C) Main Control Thyristor

(D) Multi Channel Transistor

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

(A) Resistor

(B) Capacitor

(C) RC snubber

(D) Inductor

71. Series operation is used for :

(A) Increasing current

(B) Increasing voltage rating

(C) Reducing power

(D) Increasing frequency

72. Parallel operation is used for :

(A) Increasing voltage

(B) Increasing current

(C) Reducing current

(D) Reducing voltage

73. Commutation means :

(A) Turning ON

(B) Turning OFF

(C) Voltage control

(D) Current control

74. MOSFET is :

(A) Current controlled

(B) Voltage controlled

(C) Temperature controlled

(D) Frequency controlled

75. IGBT combines :

(A) MOSFET + BJT

(B) SCR + MOSFET

(C) BJT + SCR

(D) MOSFET + DIAC

76. 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

77. Choppers are also called :

(A) Inverters

(B) DC transformers

(C) Rectifiers

(D) Cycloconverters

78. Chopper operation is based on :

(A) Linear control

(B) Switching principle

(C) Amplification

(D) Filtering

79. Time ratio control in chopper refers to :

(A) Voltage ratio

(B) Frequency ratio

(C) Duty cycle control

(D) Power ratio

80. Duty cycle (D) is defined as :

(A) OFF time/Total time

(B) ON time/Total time

(C) ON time/OFF time

(D) Frequency × time

81. Choppers are classified based on :

(A) Voltage

(B) Current

(C) Quadrant operation

(D) Frequency

82. Output voltage of step-down chopper is :

(A) Greater than input

(B) Equal to input

(C) Less than input

(D) Zero

83. If duty cycle increases, output voltage :

(A) Decreases

(B) Increases

(C) Remains same

(D) Becomes zero

84. In step-down chopper, switch is :

(A) Always ON

(B) Always OFF

(C) Periodically ON and OFF

(D) Never ON

85. In RL load, current is :

(A) Discontinuous always

(B) Continuous due to inductance

(C) Zero

(D) Infinite

86. Freewheeling diode is used to :

(A) Increase voltage

(B) Maintain current continuity

(C) Reduce frequency

(D) Increase power

87. When switch is OFF in RL load :

(A) Current becomes zero instantly

(B) Current flows through diode

(C) Voltage becomes zero

(D) Power stops

88. Energy stored in inductor is :

(A) Dissipated instantly

(B) Returned to source

(C) Maintained through free-wheeling path

(D) Lost

89. Type E chopper operates in :

(A) One quadrant

(B) Two quadrants

(C) Three quadrants

(D) Four quadrants

90. Output voltage of step-up chopper is :

(A) Less than input

(B) Equal to input

(C) Greater than input

(D) Zero

91. When duty cycle increases in boost converter :

(A) Output decreases

(B) Output increases

(C) Output constant

(D) Output zero

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

(A) Capacitor

(B) Resistor

(C) Inductor

(D) Diode

93. Type D chopper operates in :

(A) First and second quadrant

(B) First and fourth quadrant

(C) All quadrants

(D) Only one quadrant

94. 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

95. Type B chopper operates in :

(A) First quadrant

(B) Second quadrant

(C) Third quadrant

(D) Fourth quadrant

96. Type A chopper operates in :

(A) First quadrant

(B) Second quadrant

(C) Third quadrant

(D) Fourth quadrant

97. 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

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

(A) Diode

(B) SCR

(C) MOSFET

(D) IGBT

99. Output of half-wave controlled rectifier is :

(A) Pure DC

(B) Pulsating DC

(C) AC

(D) Zero

100. Firing angle (α) is :

(A) Conduction angle

(B) Delay in triggering SCR

(C) Output voltage

(D) Input frequency

(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।