

Signature and Name of Invigilator

Roll No.

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(In figures as per admission card)

1. (Signature) _____
(Name) _____

2. (Signature) _____
(Name) _____

Roll No. _____
(In words)

Test Booklet No.

D—8806

PAPER—III

Time : 2½ hours]

ELECTRONIC SCIENCE

[Maximum Marks : 200

Number of Pages in this Booklet : 32

Number of Questions in this Booklet : 26

Instructions for the Candidates

1. Write your roll number in the space provided on the top of this page.
2. Answers to short answer/essay type questions are to be given in the space provided below each question or after the questions in the Test Booklet itself.
No Additional Sheets are to be used.
3. At the commencement of examination, the question booklet will be given to you. In the first 5 minutes, you are requested to open the booklet and compulsorily examine it as below :
 - (i) To have access to the Test Booklet, tear off the paper seal on the edge of this cover page. Do not accept a booklet without sticker-seal and do not accept an open booklet.
 - (ii) **Tally the number of pages and number of questions in the booklet with the information printed on the cover page. Faulty booklets due to pages/questions missing or duplicate or not in serial order or any other discrepancy should be got replaced immediately by a correct booklet from the invigilator within the period of 5 minutes. Afterwards, neither the question booklet will be replaced nor any extra time will be given.**
4. Read instructions given inside carefully.
5. One page is attached for Rough Work at the end of the booklet before the Evaluation Sheet.
6. If you write your name or put any mark on any part of the Answer Sheet, except for the space allotted for the relevant entries, which may disclose your identity, you will render yourself liable to disqualification.
7. You have to return the Test booklet to the invigilators at the end of the examination compulsorily and must not carry it with you outside the Examination Hall.
8. **Use only Blue/Black Ball point pen.**
9. **Use of any calculator or log table etc. is prohibited.**
10. **There is NO negative marking.**

परीक्षार्थियों के लिए निर्देश

1. पहले पृष्ठ के ऊपर नियत स्थान पर अपना रोल नम्बर लिखिए।
2. लघु प्रश्न तथा निबंध प्रकार के प्रश्नों के उत्तर, प्रत्येक प्रश्न के नीचे या प्रश्नों के बाद में दिये हुये रिज्त स्थान पर ही लिखिये।
इसके लिए कोई अतिरिक्त कागज का उपयोग नहीं करना है।
3. परीक्षा प्रारम्भ होने पर, प्रश्न-पुस्तिका आपको दे दी जायेगी। पहले पाँच मिनट आपको प्रश्न-पुस्तिका खोलने तथा उसकी निम्नलिखित जाँच के लिए दिये जायेंगे जिसकी जाँच आपको अवश्य करनी है :
 - (i) प्रश्न-पुस्तिका खोलने के लिए उसके कवर पेज पर लगी सील को फाड़ लें। खुली हुई या बिना स्टीकर-सील की पुस्तिका स्वीकार न करें।
 - (ii) **कवर पृष्ठ पर छपे निर्देशानुसार प्रश्न-पुस्तिका के पृष्ठ तथा प्रश्नों की संख्या को अच्छी तरह चैक कर लें कि ये पूरे हैं। दोषपूर्ण पुस्तिका जिनमें पृष्ठ / प्रश्न कम हों या दुबारा आ गये हों या सीरियल में न हों अर्थात् किसी भी प्रकार की त्रुटिपूर्ण पुस्तिका स्वीकार न करें तथा उसी समय उसे लौटाकर उसके स्थान पर दूसरी सही प्रश्न-पुस्तिका ले लें। इसके लिए आपको पाँच मिनट दिये जायेंगे। उसके बाद न तो आपकी प्रश्न-पुस्तिका वापस ली जायेगी और न ही आपको अतिरिक्त समय दिया जायेगा।**
4. अन्दर दिये गये निर्देशों को ध्यानपूर्वक पढ़ें।
5. उत्तर-पुस्तिका के अन्त में कच्चा काम (Rough Work) करने के लिए मूल्यांकन शीट से पहले एक पृष्ठ दिया हुआ है।
6. यदि आप उत्तर-पुस्तिका पर अपना नाम या ऐसा कोई भी निशान जिससे आपकी पहचान हो सके, किसी भी भाग पर दर्शाते या अंकित करते हैं तो परीक्षा के लिये अयोग्य घोषित कर दिये जायेंगे।
7. आपको परीक्षा समाप्त होने पर उत्तर-पुस्तिका निरीक्षक महोदय को लौटाना आवश्यक है और इसे परीक्षा समाप्ति के बाद अपने साथ परीक्षा भवन से बाहर न लेकर जायें।
8. **केवल नीले / काले बाल प्वाइंट पेन का ही इस्तेमाल करें।**
9. **किसी भी प्रकार का संगणक (कैलकुलेटर) या लाग टेबल आदि का प्रयोग वर्जित है।**
10. **गलत उत्तर के लिए अंक नहीं काटे जायेंगे।**

ELECTRONIC SCIENCE

PAPER—III

NOTE: This paper is of two hundred (200) marks containing four (4) sections. Candidates are required to attempt the questions contained in these sections according to the detailed instructions given therein.

SECTION - I

Note : This section contains five (5) questions based on the following paragraph. Each question should be answered in about thirty (30) words and each carries five (5) marks.

(5x5=25 marks)

Like bipolar transistor, the FET is a three-terminal device in which the current through two terminals is controlled at the third. Unlike the BJT, however, field-effect devices are controlled by a voltage at the third terminal rather than by a current. Another difference is that the FET is a unipolar device; that is, the current involves only majority carriers. The field-effect transistor comes in several forms. In a junction FET (called a JFET) the control (gate) voltage varies the depletion width of a reverse-biased p-n junction. A similar device results if the junction is replaced by a Schottky-barrier (metal-semiconductor FET, called a MESFET). Alternatively the metal gate electrode may be separated from the semiconductor by an insulator (metal insulator-semiconductor FET, called a MISFET). A common type uses an oxide layer as the insulator (MOSFET). The various types of FET are characterized by a high input impedance, since the control voltage is applied to a reverse-biased junction or Schottky barrier or across an insulator. These devices are particularly well suited for controlled switching between a conducting state and a non conducting state, and are therefore useful in digital circuits. In fact, millions of MOS transistors are commonly used together in semiconductor memory devices.

1. In JFET how the p - n junction control the effective cross-sectional area of a conducting channel.

2. Discuss the fabrication of a MOSFET.

3. Explain the operation of an enhancement mode MOSFET.

4. Define the threshold voltage in case of enhancement mode and depletion mode MOSFET.

5. Discuss the mechanism of current flow beyond pinch off in enhancement mode MOSFET.

SECTION - II

Note : This section contains fifteen (15) questions each to be answered in about thirty (30) words. Each question carries five (5) marks.

(5x15=75 marks)

6. Explain with necessary diagram the various current components of an npn transistor and derive the relation between α and β for the transistor.

7. Draw the circuit diagram of a regulated power supply and explain its operation.

8. Define (a) accuracy (b) sensitivity (c) resolution with reference to DAC.

9. What are the important features of 8051.

10. Illustrate the difference between structures and arrays in C programming.

11. What are TE, TM and TEM modes ?

12. Define the terms minimum length, optimum length and maximum length of pyramiddal horn antenna.

13. Describe the meaning and importance of quantization error in a PCM system.

14. Explain what is meant by a graded index fiber, giving an expression for the possible refractive index profile.

15. What is the basic difference between Choppers and Inverters.

16. Explain why fiber optic communication offers the largest bandwidth.

17. What is meant by Transducers ? Mention different types of transducers.

18. Discuss Hall effect in semiconductors.

19. What are four different types of control systems. Give example of each.

20. Mention different types of Memories.

SECTION - III

Note : This section contains five (5) questions. Each question carries twelve (12) marks and is to be answered in about two hundred (200) words. **(12x5=60 marks)**

- 21.** Describe the physical mechanism of Zener breakdown. Draw a circuit which uses zener diode to regulate the voltage across a load.

- 22.** State clearly the Thevenin's and Superposition theorems and explain their usefulness in linear network analysis.

- 23.** Draw the circuits of OPAMP integrator and differentiator. Explain their operations.

- 24.** Give a schematic diagram of gunn diode and explain its principle of working.

- 25.** What is the difference between LED and LASER. Explain the operation of p - n junction laser with energy band diagram.

Lined writing area consisting of 28 horizontal lines.

Lined paper with horizontal ruling lines for writing.

FOR OFFICE USE ONLY							
Marks Obtained							
Question Number	Marks Obtained	Question Number	Marks Obtained	Question Number	Marks Obtained	Question Number	Marks Obtained
1		26		51		76	
2		27		52		77	
3		28		53		78	
4		29		54		79	
5		30		55		80	
6		31		56		81	
7		32		57		82	
8		33		58		83	
9		34		59		84	
10		35		60		85	
11		36		61		86	
12		37		62		87	
13		38		63		88	
14		39		64		89	
15		40		65		90	
16		41		66		91	
17		42		67		92	
18		43		68		93	
19		44		69		94	
20		45		70		95	
21		46		71		96	
22		47		72		97	
23		48		73		98	
24		49		74		99	
25		50		75		100	

Total Marks Obtained (in words)

(in figures)

Signature & Name of the Coordinator

(Evaluation) Date