

Signature and Name of Invigilator

1. (Signature) _____

(Name) _____

2. (Signature) _____

(Name) _____

Roll No.

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(In figures as per admission card)

Roll No. _____

(In words)

Test Booklet No. _____

J-8809

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.

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 रिक्त 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।

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.

(5×5=25 marks)

Microprocessors came in use from 1971 with the design of 4004 micro-controllers at *INTEL*. 4004 was a 4-bit device. Soon 8-bit microprocessors dominated the scene. The players from 8-bit microprocessors were 8085, 6800, 6502, Z80 and so on. Microprocessors contain *CPU*, registers and timing and control circuits. The addressable capabilities of 8-bit microprocessors are limited to 64 *kB*, beside its 8-bit data handling capacity. This led to the development of higher microprocessors like 8086, 80286 from Intel and other manufacturers. However, spread sheets, *CAD* and other scientific and commercial applications required still higher versions of microprocessors. This led to the development of 32-bit and 64-bit microprocessors. The main use of a microprocessor is as a *CPU* of a computer system which requires an operating system for its operation. The large addressing capacity, more on-chip functionality, higher speed etc. are all possible due to developments in *VLSI* technology.

1. Explain the meaning of 4-bit, 8-bit etc. microprocessors.

2. Which technology is used for manufacturing 8085 ?

3. Which pin of 8086 is not compatible with 8085 for memory interfacing ?

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. Why does the *Ge* crystal have more free electrons than the *Si* crystal at room temperature ?

7. A 5 V breakdown Zener has 0.4 Watt power dissipation capacity. What is the I_{zmax} ?

8. State the maximum power transfer theorem.

9. Why is a differentiator circuit not preferred in analog computation ?

10. Why is negative feedback introduced in amplifiers ?

11. State the applications of Shift Registers.

12. What is the basic difference between a microprocessor and a microcontroller ?

13. Explain the meaning of &age.

14. How will you initialize an array of elements (3, 5, 8, 2, 9, 43, 56) with name "num" ?

15. State the divergence theorem and explain the physical significance of divergence.

16. Define Radiation resistance of an Antenna.

17. Differentiate between Frequency Modulation (*FM*) and Phase Modulation (*PM*) with respect to modulation index.

18. Name various gate protection circuits in thyristors.

19. What is the application of an Optocoupler ?

20. What is thermoelectric effect ? Name a device based on this effect.

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. Draw and explain I-V characteristics of a transistor in CE mode and indicate
(i) cut-off,
(ii) active and
(iii) saturation regions.

Which h -parameters can be obtained from the o/p I-V characteristics and how ? Why do the characteristics crowd towards higher values of i_B and what is its draw back ?

22. What are poles and zeros and their physical significance ?
Draw the pole zero plot for the given network function and obtain time domain form of it. Is the network stable ?

$$V(s) = \frac{4(s+2)s}{(s+1)(s+3)}$$

23. What are the advantages of active filters over passive filters ?
Design a second order low pass filter at a high cut off frequency of 1 kHz. Assume $R_1 = R_2 = R$ and $C_1 = C_2 = C$.

24. What are the features of the 8051 Microcontroller ? Explain its 128 byte internal RAM map.

25. (a) Starting with Maxwell's equations obtain the wave equation for \vec{H} in a nonmagnetic lossless medium.

- (b) In a lossless medium for which η (impedance) = 60π , $\mu_r = 1$ the magnetic field of a plane wave can be written as

$$\vec{H} = -0.1 \cos(\omega t - z) \hat{x} + 0.5 \sin(\omega t - z) \hat{y} \text{ A/m}$$

Determine :

- (i) the relative permittivity ϵ_r , (ii) the wavelength,
(iii) the wave velocity, (iv) the \vec{E} field.

Lined writing area with 25 horizontal lines.

SECTION - IV

Note : This section consists of one essay type question of **forty (40)** marks to be answered in about **one thousand (1000)** words, [each part carries **ten (10)** marks].

(40x1=40 marks)

26. (a) State and explain Norton's theorem with a neat circuit diagram.
(b) Explain the terms :
(i) propagation delay,
(ii) power dissipation,
(iii) fan in and
(iv) fan out
and compare TTL, LSTTL, CMOS and ECL logic. Why are open collector gates provided ?
(c) What is Poynting Vector ? Derive the equations defining the Poynting Vector.
(d) What is a *LASER* ? Explain the functioning of a three level laser.

OR

- (a) Write a program in assembly language of 8085 for
(i) block transfer (ii) to convert packed *BCD 54H* to *ASCII* unpacked.
(b) What are arrays and how are they initialized ? Write a program to enter the marks 50, 62, 75, 81, 69 in an array named "marks", find the average percentage of marks accessing the array and display the result.
(c) Develop the velocity algorithm for a PID controller and draw its flow chart.
(d) What is the principle of operation and quantities measured by the following sensors :
(i) *RTD* (ii) thermocouple
(iii) Bourdon tube (iv) *LVTD*
(v) Strain guage.

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