

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.

J-8807

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

- Write your roll number in the space provided on the top of this page.
- 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.
- 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 :
 - 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.
 - 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.**
- Read instructions given inside carefully.
- One page is attached for Rough Work at the end of the booklet before the Evaluation Sheet.
- 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.
- 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.
- Use only Blue/Black Ball point pen.
- Use of any calculator or log table etc. is prohibited.
- There is NO negative marking.

परीक्षार्थियों के लिए निर्देश

- पहले पृष्ठ के ऊपर नियत स्थान पर अपना रोल नम्बर लिखिए।
- 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।
- 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 :
 - 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।
 - 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।
- अन्दर दिये गये निर्देशों को ध्यानपूर्वक पढ़ें।
- उत्तर-पुस्तिका के अन्त में कच्चा काम (Rough Work) करने के लिए मूल्यांकन शीट से पहले एक पृष्ठ दिया हुआ है।
- 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।
- 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।
- केवल नीले / काले बाल प्वाइंट पेन का ही इस्तेमाल करें।
- किसी भी प्रकार का संगणक (कैलकुलेटर) या लाग टेबल आदि का प्रयोग वर्जित है।
- 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 question carries five (5) marks.

(5x5=25 marks)

The broad definition of a transducer includes devices which convert mechanical energy into electrical energy. These devices form a very large and important group of transducers commonly used in industrial instrumentation. Many physical parameters such as heat, intensity of light, sound, vibration, acceleration, pressure, magnetic field, liquid level, noise, force, etc., may be converted into electrical signal by means of the electrical transducers. These transducers provide an output signal in the form of electrical signal when stimulation by a mechanical or a non-mechanical input, for example, a photoconductor converts light intensity into change of resistance, a thermocouple converts heat energy into electrical voltage, a force produces a change in resistance in a strain gauge, an acceleration produce a voltage in a piezoelectric crystal and so on. In all cases, however, the electrical output is measured by standard methods; giving the magnitude of the input quantity in terms of an analogous output.

1. Differentiate between the active and passive transducers.

2. Explain the working principle of a thermocouple.

3. Describe the Hall effect and its application in transducers.

4. State the piezoelectric effect and explain how it is utilized in transducers for the measurement of force.

5. Explain the operating principle of a photovoltaic cell.

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. Draw the hybrid equivalent circuit of a BJT in CE configuration and explain the physical meaning of different h - parameters used in the circuit

7. State and prove Thevenin's theorem.

8. Compare capacitive and inductive transducers with regard to their utility.

9. Draw a Schmitt trigger circuit and explain its working.

10. Define the reverse recovery time and reverse recovery current of the power diodes.

11. Give the method for the fabrication of npn monolithic transistors.

12. Define slew-rate in an operational amplifier. How off-set is adjusted in an operational amplifier ?

13. Draw an equivalent circuit of a TRIAC and a circuit diagram using TRIAC for controlling AC power.

14. Prove the following are the Exclusive OR function.

(a) $(A + B)(\bar{A} + \bar{B})$,

(b) $\overline{AB + \bar{A}\bar{B}}$

15. Explain the vectored interrupt and device polling.

16. Define quantization noise. Which type of modulation employs quantization and explain how ?

17. Describe the need and method of use of pointers in C.

18. Compare the characteristics of n-channel and p-channel JFETs.

19. Define gain and radiation efficiency of an antenna. Write the properties of an isotropic antenna.

20. With the help of a schematic diagram, describe the working principle of a two - cavity klystron.

SECTION - III

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

21. Draw an equivalent circuit of a lossy transmission line and find the expressions for the characteristic impedance, attenuation constant and phase propagation constant. Discuss the difference between characteristic impedance and line impedance.

22.

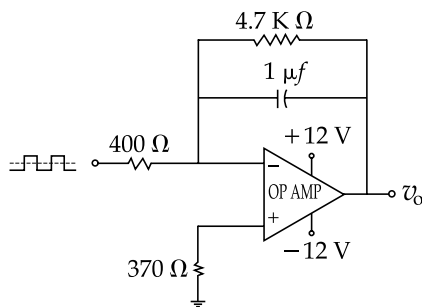


Figure 1

The input signal in the Figure-1 shown above is a square wave of 50Hz alternating between $\pm 12V$.

- (a) Find the output v_o , waveform shape and amplitude.
- (b) Calculate the minimum slew-rate.

23. Explain how a JK flip flop can be converted into a T - flip flop.

24. Write the control words for the following configuration of the parts of Intel 8255 for mode 2 operations.

- | | | |
|----------------|---|---------------|
| Part A | - | bidirectional |
| mode of Part A | - | mode 2 |
| Part B | - | output |
| mode of Part B | - | mode 1 |

25. Explain and derive an expression for the followings with respect to the FM modulator

- (a) Modulation index
- (b) The voltage distribution in FM wave
- (c) The power in modulated FM wave

SECTION - IV

Note : This section consists of one essay type question of forty (40) marks to be answered in about one thousand (1000) words on any of the following topics.

(40x1=40 marks)

26. (a) Explain the operation of the pn-junction diode in the forward and reverse bias conditions. Discuss the effect of doping in the semiconductor.
- (b) Find the rectification efficiency and ripple factor of a bridge rectifier.
- (c) Draw a shunt - voltage regulator circuit and explain its functioning.
- (d) Draw a successive approximation type A/D converter circuit and explain its functioning.

OR

- (a) Draw a circuit to control the speed of a DC series motor using SCR and explain its functioning.
- (b) Describe the GUNN effect and explain the operation of GUNN device under quenched mode.
- (c) Draw a Wein-bridge oscillator circuit and find its oscillation condition.
- (d) Draw a frequency modulator and demodulator circuits and explain its operation.

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