Signature and Name of Invigilator

1. (Signature) ____________________________
   (Name) ____________________________
2. (Signature) ____________________________
   (Name) ____________________________

Roll No. ☐☐☐☐☐☐☐☐

(In figures as per admission card)

Roll No.______________________________

(In words)

J 8 8 1 0

Test Booklet No.

Time : **2 $^1/_2$** hours]

PAPER-III

ELECTRONIC SCIENCE

[Maximum Marks : **200**

Number of Pages in this Booklet : **24**

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. Answer 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 Question 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 हुए 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 कागज की 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 अर्थात 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 प्वाईंट पैन 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 consists of **two** essay type questions of **twenty (20)** marks each, to be answered in about **five hundred (500)** words each. **(2 × 20 = 40 marks)**

1. Discuss how the design is transferred from the initial art work to the final design on a silicon wafer using photolithography technique.

OR

Write an essay on combinational logic.

2. Explain the applications of OPAMP as (i) adder, (ii) integrator, (iii) differentiator & (iv) Schmitt trigger.

OR

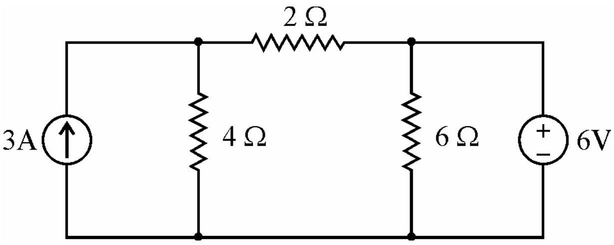
What are different methods to control speed of a dc motor ? Explain any one technique in detail.

SECTION – II

Note : This section contains **three (3)** questions of **fifteen (15)** marks each to be answered in about **three hundred (300)** words. **(3 × 15 = 45 marks)**

3. Explain with suitable diagram demultiplexing of $AD_0 - AD_7$ and formation of Address, data and control buses for 8085.

4. (a) Calculate all the currents through the resistances and delivered by voltage source of the following circuit. **(10)**



(b) Determine the Laplace Transform of following function

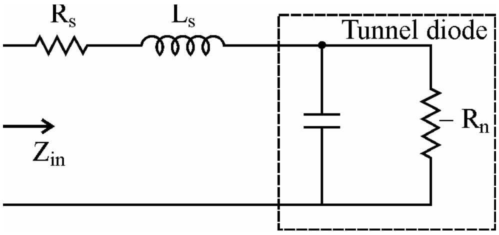
$$F(s) = \frac{s}{(s+2)\,(s+1)}$$ **(5)**

5. Derive the value of numerical aperture and acceptance angle in a fiber optic communition system. Discuss how the data rate increases with the change in the value of numerical aperture ?

SECTION – III

Note : This section contains **nine (9)** questions of **ten (10)** marks, each to be answered in about **fifty (50)** words. **(9 × 10 = 90 marks)**

6. The equivalent circuit of tunnel diode is shown below :



Calculate its input impedance.

7. Define tree, cotree, nodes, loops and incidence matrix w.r.to the graph theory.

8. Draw the structure of MOSFET and explain the threshold voltage for enhancement mode and depletion mode MOSFET by drawing the transfer characteristics.

9. How NAND gate works as a universal gate ?

10. What is the difference between post-increment and pre-increment operations ?

11. Define gain and radiant frequency of an antenna. Give one property of isotropic antenna.

12. Explain the function of physical layer in data communication system.

13. What do you mean by coherence ? Why LASER exhibits high degree of coherence ?

14. What is the significance of hysteresis in ON-OFF controller ?

SECTION – IV

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

(5 × 5 = 25 marks)

There are several conventional vacuum tubes and microwave tubes in common use. The conventional vacuum tubes such as triodes, tetrodes and pentodes are still used as signal source of low output power at low microwave frequencies. The most important microwave tubes at present one two kavity klystron and reflex klystrons. The advent of klystron amplifier began in 1939. The two cavity klystron is widely used as microwave amplifier operated by principle of velocity and current modulation. All electrons injected from cathode arrive at the first cavity with uniform velocity and then pass through the second cavity. As a result of these actions the electrons gradually bunched together as they travel down the drift space. In 1957, the first solid state microwave devices was invented in 1957 and is called the tunnel diodes. Tunnel diode is useful in microwave oscillators and amplifiers. It exhibits a negative resistance characteristics in the region between peak current and valley current.

15. What is velocity modulation ?

16. What is current modulation ?

17. Discuss briefly the bunching process. How does it take place ?

18. Draw the current-voltage characteristics of tunnel diode and mark the tunnelling current.

19. Explain the operation of tunnel diode.

FOR OFFICE USE ONLY	
Marks Obtained	
Question Number	Marks Obtained
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Total Marks Obtained (in words) ....

(in figures) ....

Signature & Name of the Coordinator ....

(Evaluation) Date ....