Signature and Name of Invigilator

1. (Signature) _____

   (Name) _____

2. (Signature) _____

   (Name) _____

Answer Sheet No. : .....
(To be filled by the Candidate)

Roll No. | | | | | | | |
(In figures as per admission card)

Roll No. _____
(In words)

Test Booklet No.

J–8805

PAPER–II

Time : 1¼ hours] **ELECTRONIC SCIENCE** **[Maximum Marks : 100**

Number of Pages in this Booklet : **12** Number of Questions in this Booklet : **50**

Instructions for the Candidates

1. Write your roll number in the space provided on the top of this page.
2. This paper consists of fifty multiple-choice type of questions.
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.**
   (iii) After this verification is over, the Serial No. of the booklet should be entered in the Answer-sheets and the Serial No. of Answer Sheet should be entered on this Booklet.
4. Each item has four alternative responses marked (A), (B), (C) and (D). You have to darken the oval as indicated below on the correct response against each item.

   Example : (A) (B) ● (D)

   where (C) is the correct response.
5. Your responses to the items are to be indicated in the Answer Sheet given **inside the Paper I booklet only**. If you mark at any place other than in the ovals in the Answer Sheet, it will not be evaluated.
6. Read instructions given inside carefully.
7. Rough Work is to be done in the end of this booklet.
8. If you write your name or put any mark on any part of the test booklet, except for the space allotted for the relevant entries, which may disclose your identity, you will render yourself liable to disqualification.
9. You have to return the test question booklet to the invigilators at the end of the examination compulsorily and must not carry it with you outside the Examination Hall.
10. **Use only Blue/Black Ball point pen.**
11. **Use of any calculator or log table etc., is prohibited.**
12. **There is NO negative marking.**

परीक्षार्थियों के लिए निर्देश

1. पहले पृष्ठ के ऊपर नियत स्थान पर अपना रोल नम्बर लिखिए।
2. इस प्रश्न-पत्र में पचास बहुविकल्पीय प्रश्न हैं।
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।**
   (iii) इस जाँच के बाद प्रश्न-पुस्तिका की क्रम संख्या उत्तर-पत्रक पर अंकित करें और उत्तर-पत्रक की क्रम संख्या इस प्रश्न-पुस्तिका पर अंकित कर दें।
4. प्रत्येक प्रश्न के लिए चार उत्तर विकल्प (A), (B), (C) तथा (D) दिये गये हैं। आपको सही उत्तर के दीर्घवृत्त को पेन से भरकर काला करना है जैसा कि नीचे दिखाया गया है।

   उदाहरण : (A) (B) ● (D)

   जबकि (C) सही उत्तर है।
5. प्रश्नों के उत्तर **केवल प्रश्न पत्र I के अन्दर दिये गये** उत्तर-पत्रक पर ही अंकित करने हैं। यदि आप उत्तर पत्रक पर दिये गये दीर्घवृत्त के अलावा किसी अन्य स्थान पर उत्तर चिन्हांकित करते है, तो उसका मूल्यांकन नहीं होगा।
6. अन्दर दिये गये निर्देशों को ध्यानपूर्वक पढ़ें।
7. कच्चा काम (Rough Work) इस पुस्तिका के अन्तिम पृष्ठ पर करें।
8. 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।
9. आपको परीक्षा समाप्त होने पर उत्तर-पुस्तिका निरीक्षक महोदय को लौटाना आवश्यक है और परीक्षा समाप्ति के बाद अपने साथ परीक्षा भवन से बाहर न लेकर जायें।
10. **केवल नीले / काले बाल प्वाईंट पैन का ही इस्तेमाल करें।**
11. **किसी भी प्रकार का संगणक (कैलकुलेटर) या लाग टेबल आदि का प्रयोग वर्जित है।**
12. **गलत उत्तर के लिए अंक नहीं काटे जायेंगे।**

ELECTRONIC SCIENCE

PAPER – II

Note : This paper contains **fifty** (50) multiple-choice questions, each question carrying **two** (2) marks. Attempt **all** of them.

1. A Zener diode works on the principle of :

(A) tunneling of charge carriers across the junction

(B) thermionic emission

(C) diffusion of charge carriers across the junction

(D) hopping of charge carriers across the junction

2. The pinch off voltage of JFET is 5.0 volts. Its cut off voltage is :

(A) $\sqrt{5}$ V (B) 2.5 V (C) 5.0 V (D) $5^{3/2}$ V

3. The Fourier transform of a function $f(t)$ is given by :

(A) $\int_0^{\infty} f(t)\, e^{-st}\, dt$ (B) $\int_0^{\infty} f(t)\, e^{-jwt}\, dt$

(C) $\int_{-\infty}^{+\infty} f(t)\, e^{jwt}\, dt$ (D) $\int_{-\infty}^{+\infty} f(t)\, e^{-jwt}\, dt$

4. Norton's theorem results in :

(A) a current source with an impedance in parallel

(B) a voltage source with an impedance in series

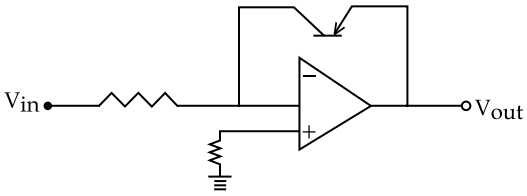
(C) a voltage source alone

(D) a current source alone

5. CMRR (Common Mode Rejection Ratio) for a differential amplifier should be :

(A) Zero (B) Unity (C) Small (D) Large

6. The Op.amp circuit shown in the given figure can be used for :



(A) addition (B) subtraction

(C) both addition and subtraction (D) multiplication

7. The toggle operation is used :

(A) with a gate circuit (B) with a flip-flop

(C) without a flip-flop (D) all of the above

8. Data can be changed from analog signal to special code and vice-versa by using :

(A) ADC and DAC (B) Shift register

(C) Synchronous counter (D) Timer

9. The no. of flags in Intel 8085 Microprocessor is :

(A) 2 (B) 3 (C) 4 (D) 5

10. What is the direction of address bus ?

(A) Unidirectional into μp

(B) Bidirectional

(C) Unidirectional out of μp

(D) Mixed direction in μp and some other out of μp

11. A compiler for a high level language runs on one machine and produces code for a different machine is called :

(A) Optimizing compiler (B) One pass compiler

(C) Cross compiler (D) Multi-pass compiler

12. Yagi-Uda antenna input impedance is approximately :

(A) 75 Ω (B) 150 Ω (C) 300 Ω (D) 220 Ω

13. When the phase velocity of an electromagnetic wave depends on frequency in any medium, the phenomenon is called :

(A) Scattering (B) Polarization (C) Absorption (D) Dispersion

14. For a given data rate, the bandwidth required with m-ary transmission is smaller than that for binary transmission by :

(A) $\log_2 m$ (B) $\frac{\log_2 m}{m}$ (C) $\frac{2}{\log_2 m}$ (D) $\frac{\log_2 m}{2}$

15. For time division multiplexing, the modulation used is :

(A) PAM (B) PWM (C) PCM (D) PPM

16. A device that does not have the gate terminal is :

(A) triac (B) FET (C) SCR (D) diac

17. Silicon photodetectors are useful at wavelength of :

(A) 800 - 900 nm (B) 1300 nm (C) 1550 nm (D) 400 nm

18. Which one of the following additional devices is required in order to measure pressure using LVDT ?

(A) Strain gauge (B) Pilot tube (C) Bourden tube (D) Rotameter

19. Signal flow graph is used to find :

(A) transfer function of the system (B) stability of the system

(C) controllability of the system (D) poles of the system

20. Hall effect transducer can be used to measure :

(A) Mobility, conductivity and carrier type

(B) Displacement, position and velocity

(C) Position, magnetic flux and pressure

(D) Displacement, position and magnetic flux

(Question No. 21 to 30) : The following items consist of two statements, one labelled the "Assertion (A)" and the other labelled the "Reason (R)". You are to examine these two statements carefully and decide if the Assertion A and the Reason R are individually true and if so, whether the Reason is a correct explanation of the Assertion. Select your answers to these items using the codes given below and mark your answer sheet accordingly.

Codes :

(A) Both **(A)** and **(R)** are true and **(R)** is the correct explanation of **(A)**

(B) Both **(A)** and **(R)** are true but **(R)** is not a correct explanation of **(A)**

(C) **(A)** is true but **(R)** is false

(D) **(A)** is false but **(R)** is true

21. **Assertion (A)** : Considering p-n-p and n-p-n transistors of identical constructions as far as shape, size and doping are concerned, the n-p-n transistor will have better frequency response.
Reason (R) : The electron mobility is higher than that of hole mobility.

22. **Assertion (A)** : Superposition theorem can be used to determine the output of a full wave rectifier whose inputs are sinusoidal signals at different frequencies connected in series.
Reason (R) : Superposition theorem holds good for all linear systems.

23. **Assertion (A)** : A monostable multivibrator can be used to alter the pube width of a repetitive pulse train.
Reason (R) : Monostable multivibrator has a single stable state.

24. **Assertion (A)** : R-2R ladder type D/A converter has a higher speed of conversion than a weighted resistance D/A converter.
Reason (R) : R-2R ladder type D/A converter uses a smaller number of components than the weighted resistance D/A converter.

25. **Assertion (A)** : The "do-while" statement is used less frequently than the "while" statement.
Reason (R) : For most applications, it is more natural to test for continuation of a loop at the beginning rather than at the end of the loop.

26. **Assertion (A)** : Helical antennas can be used as feeder for large parabolic reflectors to obtain circular polarization.
Reason (R) : Parabolic reflectors reverse the sense of polarization of the wave during reflection.

27. **Assertion (A)** : FM is preferable to AM for transmitting high quality music.
Reason (R) : FM signals have higher noise immunity.

28. **Assertion (A)** : Optical fibers have broader bandwidth to conventional copper cable.
Reason (R) : The information carrying capacity of optical fibers is limited by dispersion.

29. **Assertion (A)** : The phase angle plot in Bode diagram is not affected by the variation in the gain of the system.
Reason (R) : The variation in the gain of the system has no effect on the phase margin of the system.

30. **Assertion (A)** : A total of about one million bytes can be directly addressed by the 8086 microprocessor.
Reason (R) : The interface chip used for data transmission between 8086 and a 16-bit ADC is 8255.

31. Digital measuring instruments use the following three types of A to D converters.
(i) Dual slope type
(ii) Counter type
(iii) Flash type
The correct sequence for these converters in decreasing order of their speed (fastest to slowest) is :
Codes :
(A) (iii), (i), (ii)
(B) (i), (ii), (iii)
(C) (ii), (iii), (i)
(D) (iii), (ii), (i)

32. Consider the following steps :
(i) Etching
(ii) Exposure to UV radiation
(iii) Stripping
(iv) Developing
After a wafer has been coated with photoresist, the correct sequence of these steps in photolithography is :
Codes :
(A) (ii), (iv), (iii), (i)
(B) (ii), (iv), (i), (iii)
(C) (iv), (ii), (i), (iii)
(D) (iii), (ii), (iii), (i)

33. The communication system developed are :
(i) Radar
(ii) Satellite
(iii) Telephone
(iv) Telegraph
The chronological order is :
Codes :
(A) (iv), (iii), (i), (ii)
(B) (i), (ii), (iii), (iv)
(C) (iv), (iii), (ii), (i)
(D) (ii), (i), (iv), (iii)

34. The electrodes in the electron gun of a CRT are :
(i) 3rd anode
(ii) focusing anode
(iii) cathode
(iv) heater
The order of arrangement of the electrodes in the CRT is :
Codes :
(A) (iv), (iii), (ii), (i)
(B) (i), (ii), (iii), (iv)
(C) (ii), (iii), (iv), (i)
(D) (iii), (ii), (i), (iv)

35. The Microprocessor chips available with different speed are :

(i) 8086

(ii) 80286

(iii) 8085

(iv) 80486

The increasing order of speed is :

Codes :

(A) (i), (ii), (iii), (iv)

(B) (ii), (i), (iii), (iv)

(C) (iv), (iii), (i), (ii)

(D) (iii), (i), (ii), (iv)

36. Match List-I with List-II and select the correct answer using the codes given below the lists :

	List-I		**List-II**
(a)	BJT	(i)	Pinch off effect
(b)	FET	(ii)	Controlled rectification
(c)	SCR	(iii)	Negative Resistance Characteristics
(d)	Tunnel diode	(iv)	Punch through effect

Codes :

	(a)	**(b)**	**(c)**	**(d)**
(A)	(i)	(iii)	(ii)	(iv)
(B)	(i)	(ii)	(iii)	(iv)
(C)	(iv)	(i)	(ii)	(iii)
(D)	(i)	(iv)	(iii)	(ii)

37. Match List-I with List-II and select the correct answer using the codes given below the lists :

	List-I		**List-II**
(a)	Voltage series	(i)	Input impedance increases, output impedance decreases
(b)	Current series	(ii)	Input impedance decreases, output impedance increases
(c)	Voltage shunt	(iii)	Both input and output impedance increases
(d)	Current shunt	(iv)	Both input and output impedance decreases

Codes :

	(a)	**(b)**	**(c)**	**(d)**
(A)	(i)	(iv)	(iii)	(ii)
(B)	(i)	(ii)	(iii)	(iv)
(C)	(i)	(iii)	(iv)	(ii)
(D)	(iii)	(i)	(ii)	(iv)

38. Match List-I with List-II and select the correct answer using the codes given below the lists :

	List-I		**List-II**
(a)	Darlington amplifier	(i)	Low input impedance
(b)	Cascade amplifier	(ii)	Low output impedance
(c)	Common gate amplifier	(iii)	Low input capacitance but high R_{in}
(d)	Differential amplifier	(iv)	Large Common Mode Rejection Ratio

Codes :

	(a)	**(b)**	**(c)**	**(d)**
(A)	(i)	(ii)	(iii)	(iv)
(B)	(i)	(ii)	(iv)	(iii)
(C)	(ii)	(i)	(iii)	(iv)
(D)	(ii)	(iii)	(i)	(iv)

39. Match List-I with List-II and select the correct answer using the codes given below the lists :

	List-I		**List-II**
(a)	Flip-Flop can be used as latch	(i)	D-Flip-Flop
(b)	Flip-Flop can be used as delay	(ii)	Master-Slave
(c)	Flip-Flop does not have race problem	(iii)	JK
(d)	Flip-Flop can be used as shift register	(iv)	RS

Codes :

	(a)	**(b)**	**(c)**	**(d)**
(A)	(iv)	(i)	(ii)	(iii)
(B)	(ii)	(iv)	(i)	(iii)
(C)	(i)	(iii)	(ii)	(iv)
(D)	(iii)	(i)	(iv)	(ii)

40. Match List-I with List-II and select the correct answer using the codes given below the lists :

	List-I		**List-II**
(a)	LVDT	(i)	Pressure
(b)	Bourdon tube	(ii)	Temperature
(c)	Strain gauge	(iii)	Displacement
(d)	Thermistor	(iv)	Stress

Codes :

	(a)	**(b)**	**(c)**	**(d)**
(A)	(iv)	(iii)	(ii)	(i)
(B)	(iii)	(ii)	(i)	(iv)
(C)	(iv)	(i)	(iii)	(ii)
(D)	(iii)	(i)	(iv)	(ii)

41. Match List-I with List-II and select the correct answer using the codes given below the lists :

	List-I		**List-II**
(a)	LASER	(i)	Emits light of low intensity
(b)	Solar Cell	(ii)	Detects the light incident upon it
(c)	Photo diode	(iii)	Delivers power to a load
(d)	LED	(iv)	Emits light of high intensity

Codes :

	(a)	**(b)**	**(c)**	**(d)**
(A)	(iv)	(iii)	(ii)	(i)
(B)	(i)	(ii)	(iii)	(iv)
(C)	(iv)	(iii)	(i)	(ii)
(D)	(ii)	(i)	(iv)	(iii)

42. Match List-I with List-II and select the correct answer using the codes given below the lists :

	List-I		**List-II**
(a)	helical antenna	(i)	circular polarization
(b)	horn antenna	(ii)	simplicity and compactness
(c)	long horn antenna	(iii)	low noise
(d)	parabolic dish with horn feed	(iv)	high directivity

Codes :

	(a)	**(b)**	**(c)**	**(d)**
(A)	(i)	(ii)	(iii)	(iv)
(B)	(iv)	(iii)	(ii)	(i)
(C)	(ii)	(i)	(iii)	(ii)
(D)	(i)	(ii)	(iv)	(iii)

43. Match List-I with List-II and select the correct answer using the codes given below the lists :

	List-I		**List-II**
(a)	AM	(i)	Radio communication
(b)	FM	(ii)	Constant carrier frequency
(c)	Noise in FM	(iii)	Triangular noise power spectrum
(d)	Noise in AM and FM	(iv)	Rectangular noise power spectrum

Codes :

	(a)	**(b)**	**(c)**	**(d)**
(A)	(ii)	(i)	(iv)	(iii)
(B)	(i)	(ii)	(iii)	(iv)
(C)	(i)	(ii)	(iv)	(iii)
(D)	(ii)	(i)	(iii)	(iv)

44. Match List-I with List-II and select the correct answer using the codes given below the lists :

	List-I		**List-II**
(a)	Parallel comparator	(i)	Null balancing type
(b)	Successive approximation	(ii)	Fastest converter
(c)	Dual slope	(iii)	Voltage dependent conversion type
(d)	Counter type	(iv)	Integrating type

Codes :

	(a)	**(b)**	**(c)**	**(d)**
(A)	(ii)	(i)	(iii)	(iv)
(B)	(ii)	(i)	(iv)	(iii)
(C)	(i)	(ii)	(iv)	(iii)
(D)	(i)	(ii)	(iii)	(iv)

45. Match List-I with List-II and select the correct answer using the codes given below the lists :

	List-I		**List-II**
(a)	8086	(i)	8-bit processor
(b)	8085	(ii)	Interface chip
(c)	8255	(iii)	16-bit processor
(d)	80486	(iv)	64-bit processor

Codes :

	(a)	**(b)**	**(c)**	**(d)**
(A)	(iii)	(i)	(ii)	(iv)
(B)	(i)	(ii)	(iii)	(iv)
(C)	(iv)	(i)	(ii)	(iii)
(D)	(ii)	(i)	(iv)	(iii)

Para Phrasing (Read the paragraph and answer the questions 46 to 50) :

The information age we are living in has been possible due to Microelectronic revolution popularly known as the chip revolution. Semiconductor devices play a key role in Information Technology, ie, information reception, amplification, manipulation, generation and display. Microelectronics deals with Integrated Circuits which have several advantages over discrete circuits. After the discovery of transistors in 1947, these devices were commercially available from the renowned companies like RCA, GE, Western Electronics etc. In 1956 three scientists were awarded the Noble prize first time for the discovery of transistors which are Engineering devices. The monolithic idea was first given by Kilby in 1958. Texas instruments in 1964 marketed IC's for the first time. Since then the development of IC's was phenomenal. The evolution of IC passed through SSI, MSI, LSI, VLSI and ULSI levels.

46. The term 'chip' means :

(A) Insulating substrate
(B) Magnetic substrate
(C) Semiconducting substrate
(D) Metallic substrate

47. The transistors discovered in 1947 are :

(A) Point Contact transistors

(B) Bipolar Junction transistors

(C) Field Effect transistors

(D) Unijunction transistors

48. The three scientists who were awarded the Nobel Prize in 1956 were :

(A) Schottky, Gunn and Shockley

(B) Shockley, Brattain and Bardeen

(C) Schottky, Brattain and Bardeen

(D) Kilby, Shockley and Bardeen

49. The semiconductor devices which play a key role in information generation, amplification and detection are respectively :

(A) Diodes, transistors and LEDs

(B) LASER, transistor and APD

(C) Logic gate, LCD and LED

(D) MOSFET, diode and APD

50. The number of components per chip in VLSI is :

(A) 100 to 1000

(B) 10,000 to 1,00,000

(C) 10 to 100

(D) 1000 to 10,000

- o O o -

Space For Rough Work