Signature and Name of Invigilator

1. (Signature) _____
   (Name) _____
2. (Signature) _____
   (Name) _____

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

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

Roll No._____
(In words)

D-8809

Test Booklet No.

Time : **1 $^{1}/_{4}$** hours]

PAPER-II

[Maximum Marks : **100**

ELECTRONIC SCIENCE

Number of Pages in this Booklet : **16**

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 Test Booklet Number should be entered in the OMR Sheet and the OMR Sheet Number should be entered on this Test 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 and OMR Answer sheet 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. **Negative Marking :- For each incorrect answer, 0.5 marks shall be deducted.**

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 OMR पत्रक पर अंकित करें और OMR 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 चिह्नांकित करते हैं, 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 प्रश्न-पुस्तिका एवं OMR उत्तर-पत्रक निरीक्षक महोदय को लौटाना आवश्यक है और परीक्षा समाप्ति के बाद उसे 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. **नेगेटिव अंक प्रणाली : प्रत्येक गलत उत्तर के लिए 0.5 अंक काटे जाएँगे ।**

ELECTRONIC SCIENCE

Paper – II

Note : This paper contains **fifty (50)** objective type questions, each question carrying **two (2)** marks. Attempt **all** the questions.

1. Which diode exhibits negative resistance characteristics ?

(A) Zener (B) Tunnel

(C) Schottky (D) PIN

2. Which crystal structure is preferred to fabricate BJT in VLSI technology ?

(A) <111>

(B) <100>

(C) <110>

(D) None of the above

3. Network contains only independent current sources and resistors. If the values of the all resistors are doubled, the value of the node voltages will

(A) become half

(B) remain unchanged

(C) become double

(D) be undeterminate

4. A 10 V source is connected in series with a 1 Ω resistor and 1 H inductor and the switch is closed at t = 0, the current in circuit is

(A) $10 + 10\ e^{100\ t}$ (B) $10 - 10\ e^{100\ t}$

(C) $10 + 10\ e^{-100\ t}$ (D) $10 - 10\ e^{-100\ t}$

5. A differential amplifier is used at the input stage of an Op Amp to give very high

(A) CMRR (B) Bandwidth

(C) Slew rate (D) Open loop gain

6. What is the current sourcing capacity of 7805 IC voltage regulator ?

(A) 0.5 Amp (B) 2 Amp

(C) 1 Amp (D) 5 Amp

7. Which is the fastest logic family ?

(A) TTL (B) CMOS

(C) RTL (D) ECL

8. The minimum number of NAND gates to implement $A + A\overline{B} + A\overline{B}C$

(A) Zero (B) 1

(C) 4 (D) 5

9. In which T state of every machine cycle for 8085 does ALE signal become active ?

(A) T2 (B) T1

(C) T3 (D) T4

10. The bit addressable RAM area in 8051 microcontroller is

(A) 00 H – 1 F H (B) 20 H – 2 F H

(C) 30 H – 3 F H (D) 40 H – 4 F H

11. What is the storage space required for a character ?

(A) 1 byte (B) 2 bytes

(C) 3 bytes (D) 4 bytes

12. Which is an infinite loop in C language ?

(A) for ($x = 0$; $x \leq 10$, x + +) (B) for (; $x \geq 10$)

(C) for ($x = 0$; $x \leq 10$) (D) for (; ; x + +)

13. The direction of propagation of EM wave is obtained from

(A) $\bar{E} \cdot \bar{H}$ (B) $\bar{E}$

(C) $\bar{E} \times \bar{H}$ (D) $\bar{H}$

14. The length of an antenna operating at frequency 0.5 GHz is

(A) 570 m (B) 5.70 m

(C) 57.0 m (D) 600 m

15. A pre-emphasis circuit provides extra noise immunity by

(A) boosting the bass frequencies.

(B) amplifying the higher audio frequencies.

(C) pre-amplifying the whole audio band.

(D) converting the phase modulation to FM.

16. In order to separate channels in a TDM receiver, it is necessary to use

(A) AND gates (B) band pass filters

(C) differentiators (D) integrators

17. The capacitive current flowing through the junction of a thyristor is given by

(A) $C \cdot \frac{dt}{dv}$ (B) $\frac{1}{C}\frac{dv}{dt}$

(C) $\frac{1}{C}\frac{dt}{dv}$ (D) $C\frac{dv}{dt}$

18. A dual converter is used in where

(A) Reversible d.c. is required.

(B) a.c. of higher frequency is required.

(C) a.c. of low frequency is required.

(D) ripple free d.c. is required.

19. Which is the static specification of a transducer ?

(A) Rise time

(B) Settling time

(C) Hysteresis

(D) Frequency response

20. In which mode the controller works as a variable gain amplifier ?

(A) On-off

(B) Proportional

(C) Integral

(D) PID

Question **21** to **30 :**

The following items consist of two statements, one labelled as "Assertion (A)" and the other labelled as "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 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 correct explanation of (A).

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

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

21. **Assertion (A) :** The temperature compensation circuits require additional hardware and add to the complexity, instead one zener diode sufficies the work.

Reason (R) : The temperature coefficient of 5 V zener diode is nearly zero.

22. **Assertion (A) :** The z-transforms study yields information on placement of poles and zeroes in s-plane.

Reason (R) : Poles on the real axis in left half of s-plane give exponentially decaying response.

23. **Assertion (A) :** Current 4-20 mA loop overcomes the problem of loop resistance leading to signal degradation.

Reason (R) : V to F convertor is preferred because it is not affected by loop resistance.

24. **Assertion (A) :** NAND gate provides universality.

Reason (R) : The universality is possible by De-Morgan's theorem.

25. **Assertion (A) :** Queue system is not provided in 8086 microprocessor.

Reason (R) : Queue helps interfacing slow memory without speed degradation.

26. **Assertion (A) :** The memory addresses are manipulated in 'c' through pointers.

Reason (R) : Pointers in 'c' can be added.

27. **Assertion (A) :** Ionosphere is used for the transmission of HF waves.

Reason (R) : They are reflected back by the D, E, F_1 and F_2 layers.

28. **Assertion (A) :** Choppers are used for the speed control of d.c. drives.

Reason (R) : Cycloconverters may not be used for the control of d.c. drives.

29. **Assertion (A) :** Optical fiber provides the attenuation of the order of 0.2 dB/km.

Reason (R) : Rayleigh scattering increases with the increase in the operating wavelength.

30. **Assertion (A) :** Telemetry is used for smart instrumentation in digital control systems in modern industrial units.

Reason (R) : They are capable of measuring the parameters of a process at a distance.

31. See the stages in IC Fabrication below

(i) Etching

(ii) Cleaning

(iii) Masking and exposure

(iv) Application of photo resist

Mention the correct sequence followed :

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

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

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

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

32. Consider the input impedance of the following :

(i) open loop Op Amp

(ii) BJT

(iii) MOSFET

(iv) JFET

Which is the way of showing the decrease in input impedance ?

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

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

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

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

33. Consider the following logic families :

(i) CMOS (ii) TTL

(iii) LS TTL (iv) ECL

Write the sequence of power consumption in increasing order.

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

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

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

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

34. Consider the quantum efficiency of the detector in optical communication.

(i) Photo diode (ii) Photo transistor

(iii) APD (iv) PIN diode

Write the quantum efficiency of the above devices in decreasing order.

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

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

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

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

35. Consider the following transducers.

(i) Thermistor (ii) Thermocouple

(iii) RTD (iv) IC sensor

Write the linearity order of the above in increasing order.

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

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

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

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

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

	List-I		**List-II**
(a)	SCR	(i)	Relaxation oscillator
(b)	Zener diode	(ii)	Voltage variable resistor
(c)	UJT	(iii)	Voltage regulator
(d)	FET	(iv)	Controlled Rectifier

Codes :

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

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

	List-I		**List-II**
(a)	Bode plot	(i)	Current source
(b)	Transient analysis	(ii)	Frequency domain
(c)	Norton's theorem	(iii)	Stability analysis
(d)	Fourier's Transform	(iv)	Laplace transform

Codes :

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

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

	List-I		**List-II**
(a)	IC-723	(i)	Lock-range
(b)	Oscillators	(ii)	25 mA
(c)	IC-741	(iii)	Voltage regulator
(d)	PLL	(iv)	Positive feedback

Codes :

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

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

	List-I		**List-II**
(a)	Flip flop	(i)	Digital Multimeters
(b)	Counters	(ii)	Memory
(c)	XOR-gates	(iii)	Data acquisition systems
(d)	D to A convertor	(iv)	Parity checkers

Codes :

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

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

	List-I		**List-II**
(a)	8085	(i)	On chip timer
(b)	8086	(ii)	Serial I/O pins
(c)	8255	(iii)	Segmented memory
(d)	8051	(iv)	Hand-shake mode

Codes :

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

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

	List-I		**List-II**
(a)	Character storage space	(i)	\r
(b)	O/p Array of characters	(ii)	while (1)
(c)	Infinite Loop	(iii)	1-byte
(d)	bring cursor to the beginning of current line	(iv)	% S

Codes :

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

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

	List-I		**List-II**
(a)	EDFA	(i)	Ability to collect the light
(b)	LASER	(ii)	Optical Amplifiers
(c)	Numerical Aperture	(iii)	Spontaneous Emission
(d)	LED	(iv)	Stimulated Emission

Codes :

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

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

	List-I		**List-II**
(a)	FM	(i)	Microwave generator
(b)	AM	(ii)	Ratio detector
(c)	Quantization	(iii)	PCM
(d)	Magnetron	(iv)	Envelope detector

Codes :

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

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

	List-I		**List-II**
(a)	RTD	(i)	Infinite Resolution
(b)	Hall Effect	(ii)	Change of Resistance
(c)	Instrumentation Amplifier	(iii)	Magneto resistance
(d)	LVDT	(iv)	High end variable gain

Codes :

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

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

	List-I		**List-II**
(a)	On-off control	(i)	Stability
(b)	Proportional control	(ii)	Dead zone
(c)	PID	(iii)	Residual error
(d)	Routh-Hurwitz	(iv)	Zero offset error

Codes :

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

Read the passage below, answer the questions from **46** to **50**, that follow based on your understanding of the passage.

Frequency modulation (FM) and phase modulation (PM) are two forms of angle modulation which is a form of continuous wave or analog modulation whose chief characteristics are as follows :

(1) The amplitude of the modulated carrier is kept constant.

(2) The frequency of the modulated carrier is varied by the modulating voltage.

In frequency modulation the carrier's frequency deviation is proportional to the instantaneous amplitude of the modulating voltage. In phase modulation, the carrier's phase deviation is proportional to the instantaneous amplitude of the modulating voltage. It has been mathematically shown that as the modulating frequency decreases and the modulating voltage amplitude remains constant the modulation index increases. The modulation index determines how many side bands have significant amplitude. The major advantages of angle modulation over amplitude modulation are

(1) The transmitted amplitude is constant and thus the receiver can be fitted with an efficient amplitude limiter ; this characteristics has the advantage of improving immunity to noise and interference.

(2) Since there is no natural limit to the modulation index, it can be increased to provide additional noise immunity.

The noise-signal distribution is rectangular in AM and PM, whereas triangle in FM. To reduce the effect of noise wideband FM is used for broadcast transmissions for the sound accompanying TV transmissions. Narrow band FM is used for communications in competition with single side band having its main applications in various forms of mobile communications.

The reactance modulator is a direct method of generating FM. The alternative means of generating FM the Armstrong system is one of which PM is initially generated but the modulating frequencies are correctly bass-boosted ; thus FM results in output. A very small frequency deviations are possible in basic Armstrong system.

46. In the spectrum of frequency modulated wave

(A) the carrier frequency disappears when the modulation index is large.

(B) the amplitude of any sideband depends on the modulation index.

(C) the total number of sideband depends on the modulation index.

(D) the carrier frequency cannot disappear.

47. The difference between phase and frequency modulation

(A) is purely theoretical because they are the same in practice.

(B) is too great to make the two system compatible.

(C) lies in the different definitions of the modulation index.

(D) lies in the poorer audio response of phase modulation.

48. Indicate the false statement regarding the Armstrong modulation system.

(A) The system is basically phase modulation not FM.

(B) Automatic frequency control is not needed as a crystal oscillator is used.

(C) FM must be used.

(D) Equalization is unnecessary.

49. Since noise-phase modulates the FM wave as the noise sideband frequency approaches the carrier frequency, the noise amplitude

(A) remains constant

(B) is decreased

(C) is increased

(D) is equalized

50. Indicate which one of the following is not an advantage of FM and Amplitude Modulation ?

(A) Better noise immunity is provided

(B) Lower Bandwidth is required.

(C) The transmitted power is more useful.

(D) Less modulating power is required.

Space for Rough Work