PAPER-II
ELECTRONIC SCIENCE

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)

J 8 8 1 1

Time : $1\frac{1}{4}$ hours] [Maximum Marks : **100**

Number of Pages in this Booklet : **8**

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 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, Roll Number, Phone Number 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, or use abusive language or employ any other unfair means, 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. **There is no negative marks for incorrect answers.**

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 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 ।**
   (iii) इस जाँच के बाद 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 नियत स्थान के अलावा अपना नाम, रोल नम्बर, फोन नम्बर या कोई भी ऐसा चिह्न जिससे आपकी पहचान हो सके, अंकित करते हैं अथवा अभद्र भाषा का प्रयोग करते हैं, या कोई अन्य अनुचित साधन का प्रयोग करते हैं, तो परीक्षा के लिये अयोग्य घोषित किये जा सकते हैं ।
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 पेन का ही इस्तेमाल करें ।**
11. **किसी भी प्रकार का संगणक (कैलकुलेटर) या लाग टेबल आदि का प्रयोग वर्जित है ।**
12. **गलत उत्तरों के लिए कोई अंक काटे नहीं 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. In a transistor amplifier, the reverse saturation current I_{CO}
(A) Doubles for every 10° C rise in temperature
(B) Doubles for every 1° C rise in temperature
(C) Increases linearly with temperature
(D) Doubles for every 5° C rise in temperature

2. The frequency of oscillations in Colpitts oscillator is determined by
(A) L only
(B) C only
(C) L and C only
(D) Transistor gain

3. If the voltage drop across a 2 kΩ resistor is 8 V, what is the current flowing in the resistor ?
(A) 8 mA (B) 2 mA
(C) 4 mA (D) 1 mA

4. IC 7432 is a 2-input
(A) EX-OR Gate
(B) OR Gate
(C) NOR Gate
(D) NAND Gate

5. In 8085 microprocessor, the value of most significant bit of the result following the execution of any arithmetic Boolean instruction is stored in the
(A) Carry status flag
(B) Auxilliary carry status flag
(C) Sign status flag
(D) Zero status flag

6. Which is a correct statement ?
(A) if (age = 16)
(B) if (age = = 16)
(C) if (age, 16)
(D) if (age : 16)

7. Indicate which of the following diode does not use negative resistance in its operation ?
(A) Backward (B) Gunn
(C) IMPATT (D) Tunnel

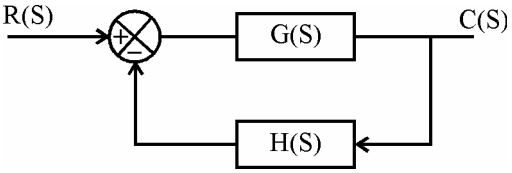
8. If the modulation index of an AM wave is changed from 0 to 1, the transmitted power is
(A) Unchanged
(B) Halved
(C) Doubled
(D) Increased by 50 percent

9. Speed of a dc motor can be controlled by
(A) Triac (B) UJT
(C) Chopper (D) Inverter

10. The resistance of thermistor is a function of
(A) Current (B) Temperature
(C) Heat (D) Voltage

11. 0.8 nm separation in wavelength division multiplexing operating at 1550 nm wavelength, refers to
(A) 10 GHz (B) 25 GHz
(C) 100 GHz (D) 2.5 GHz

12. The transfer function of the system shown below is



(A) $\frac{C(S)}{R(S)} = \frac{G(S)}{1 + G(S)\,H(S)}$

(B) $\frac{C(S)}{R(S)} = \frac{G(S)}{1 - G(S)\,H(S)}$

(C) $\frac{C(S)}{R(S)} = \frac{1}{1 + G(S)\,H(S)}$

(D) $\frac{G(S)}{R(S)} = \frac{1}{1 - G(S)\,H(S)}$

13. A $(\overline{B}+\overline{C})D$ is equal to

(A) $A + \overline{B}\overline{C} + \overline{D}$

(B) $\overline{A}(\overline{B}\overline{C} + \overline{D})$

(C) $\overline{A} + \overline{B}(\overline{C} + \overline{D})$

(D) $A \cdot (BC + \overline{D})$

14. The term critical frequency denotes

(A) The lower frequency reflected by ionosphere

(B) The highest frequency reflected by ionosphere

(C) The lowest frequency by which communication is possible between any two given points

(D) None of the above

15. Which one of the following addressing mode cannot be used in 8085 ?

(A) Direct addressing

(B) Base Register addressing

(C) Register Indirect addressing

(D) Immediate addressing

16. OP-AMP has the following

1. High input impedance
2. Low output impedance
3. Low slew rate
4. Infinite CMRR

The correct answer is

(A) 1, 2 and 4 (B) 1, 2 and 3

(C) 1, 3 and 4 (D) 1 and 3

17. IC 555 timer consists of the following :

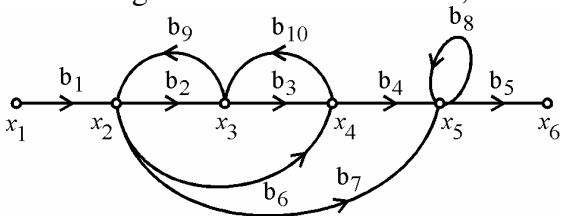
1. Differential stage
2. Flip Flop
3. Discharge Transistor
4. Discharge Capacitor

The correct answer is

(A) 1 and 4 (B) 2 and 3

(C) 1, 2 and 3 (D) 2, 3 and 4

18. A signal flow is shown below, has



1. There are three forward paths.
2. There are three individual loops.
3. There are two non-touching loops.
4. There are three non-touching loops.

The correct answer is

(A) 1 and 3 only

(B) 2 and 4 only

(C) 1 and 2 only

(D) 1, 2 and 3 only

19. In a TV transmission

1. Audio and Video are both frequency modulate.
2. Audio is frequency modulated.
3. Video is transmitted by SSB modulation.
4. Video is transmitted using USB modulation.

The correct answer is

(A) 1 and 3 (B) 2 and 4

(C) 1 and 2 (D) 3 and 4

20. Consider the following statements regarding configuration of TTL devices :

1. The output impedance of totem pole transistor is high.
2. Open collector output devices have low switching speed.
3. Power consumption of Schottky devices is high.
4. Tristate output devices have high switching speed

The correct answer is

(A) 1 and 2 are correct

(B) 1, 3 and 4 are correct

(C) 2 and 3 are correct

(D) 2, 3 and 4 are correct

Questions **21** to **30** are Assertion and Reason type. 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.

(A) and (R) Questions (**21**-**30**)

21. **Assertion (A) :** The ion implantation is done by bombarding ions to the semiconductor surface.

Reason (R) : The doping is changed by ion implantation.

22. **Assertion (A) :** Superposition theorem can be used to determine the output of a full wave rectifier whose inputs are sinusoidal signal sources of different frequencies connected in series.

Reason (R) : Superposition theorem holds good for all linear systems.

23. **Assertion (A) :** Class C amplifier is a tuned amplifier which needs a resonant tank circuit as the load in the collector circuit of the transistor for its proper operation.

Reason (R) : In class C operation, the collector current flows for less than 180° of the ac cycle and hence collector current flows in the pulses.

24. **Assertion (A) :** The race hazard problem does not occur in combinational circuits.

Reason (R) : The output of a combination circuit depends upon present inputs only.

25. **Assertion (A) :** IC 8255 A is a programmable peripheral interface device.

Reason (R) : It can work as a timer.

26. **Assertion (A) :** Helical antennas can be used as feeder for large parabolic reflectors to obtain circular polarisation.

Reason (R) : Parabolic reflectors reverse the sense of polarisation of the wave during reflection.

27. **Assertion (A) :** Frequency modulation (FM) is preferable to amplitude modulation (AM) for transmitting high quality music.

Reason (R) : FM signal can be demodulated using frequency discriminator circuit.

28. **Assertion (A) :** A triac is a three terminal semiconductor switching device which can control alternating current in a load.

Reason (R) : Triac can conduct current in either direction.

29. **Assertion (A) :** Single mode fiber (SMF) are preferred over multimode fiber (MMF) in optical fiber communication systems.

Reason (R) : The attenuation of SMF is of the order of 5 dB/km.

30. **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.

Sequence type (31-35)

31. The correct sequence in microwaves in terms of increasing frequency is

I. L Band II. S Band

III. C Band IV X Band

Correct Answer is

(A) IV, I, II, III (B) I, II, III, IV

(C) II, IV, I, III (D) III, IV, II, I

32. The correct sequence of rise in time period is

I. Pico second

II. Femto second

III. Tera second

IV. Nano second

Correct Answer is

(A) I, II, III, IV (B) IV, III, II, I

(C) II, I, IV, III (D) II, I, III, IV

33. The correct sequence of fabrication of IC's are

I. Masking

II. Metallization

III. Application of photo resist

IV. Ion implantation

(A) I, II, III, IV (B) III, I, IV, II

(C) I, II, IV, III (D) I, III, IV, II

34. Place the bandwidth required to transmit data in digital modulation technique in descending order.

I. 64 QAM II. 16 QAM

III. QPSIC IV. BPSIC

(A) I, II, III, IV (B) IV, III, II, I

(C) II, I, III, IV (D) I, IV, II, III

35. The decreasing order of propagation delay in logic families is

I. RTL II. CMOS

III. ECL IV. TTL

(A) I, II, IV, III (B) I, II, III, IV

(C) I, III, IV, II (D) I, III, II, IV

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

List – I	List – II
(a) DC voltage	(i) Reverse polarity
(b) AC voltage	(ii) Fixed polarity
(c) Ohm's law	(iii) P = W/T (where w is work done)
(d) Power	(iv) V = IR

Codes are :

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

37.

List – I	List – II
(a) Resistive Transducer	(i) Diaphragm
(b) Capacitive Transducer	(ii) LDVT
(c) Inductive Transducer	(iii) Humidity
(d) Pressure Transducer	(iv) Potentiometer

Codes are :

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

38.

List – I	List – II
(a) Trap	(i) Interrupt Acknowledge
(b) INTR	(ii) Direct Memory Access
(c) HOLD	(iii) Interrupt Request
(d) INTA	(iv) Highest Priority Interrupt

Codes are :

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

39.

List – I	List – II
(a) Lower Side Band	(i) $P_C\left(1+\frac{m^2}{2}\right)$
(b) Upper Side Band	(ii) $f_c - f_s$
(c) Bandwidth	(iii) $f_c + f_s$
(d) Power in AM	(iv) Twice the signal frequency

Codes are :

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

40.

List – I	List – II
(a) Rectifier	(i) 81.2 %
(b) Fullwave Rectifier	(ii) 40.6 %
(c) Halfwave Rectifier	(iii) 4 diodes
(d) Bridge Rectifier	(iv) AC to DC

Codes are :

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

41.

List – I	List – II
(a) Splicing	(i) Microwave oscillator
(b) PCM	(ii) Relaxation oscillator
(c) Gunn diode	(iii) Quantization
(d) UJT	(iv) Optical Fiber

Codes are :

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

42.

List – I	List – II
(a) Boolean Algebra	(i) Minimization
(b) K-Map	(ii) Synchronous circuits
(c) Clock	(iii) Error correction
(d) Parity	(iv) De Morgan's theorem

Codes are :

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

43.

List – I (System)	List – II (Order of Frequency)
(a) Optical fiber communication	(i) 4 to 6 GHz
(b) Mobile communication	(ii) 88-108 MHz
(c) FM Broadcasting	(iii) 900-1800 MHz
(d) Satellite communication	(iv) 10^{14} Hz

Codes are :

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

44.

List – I	List – II
(a) n-channel JFET is better than p-channel JFET	(i) Reverse bias increases along the channel
(b) channel is wedge shaped	(ii) High electric field near the drain and directed towards the source
(c) channel is not completely closed at pinch-off	(iii) Low leakage current at gate terminal
(d) Input impedance is high	(iv) Better frequency performance since $\mu_n >> \mu_p$

Codes are :

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

45.

	List – I		List – II
(a)	Pointers	(i)	FORTRAN
(b)	Object oriented programming	(ii)	DO LOOPS
(c)	High level language	(iii)	C++
(d)	Recursion	(iv)	C

Codes are :

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

Read the passage below and answer the questions **46** to **50** that follows based on your understanding of the passage :

An antenna is generally metallic object, often a wire or collection of wires used to convert high frequency current into electro-magnetic waves and vica-versa. Transmitting and receiving antenna behaves identically. One of the important comparison antenna is the isotropic antenna. Directive gain of the antenna is a ratio comparing power density generated by a practical antenna in some direction. An antenna has two bandwidths, both measured between half power points. Because the electro-magnetic waves radiated by the antenna have the electric and magnetic vectors at right angle to each other and the direction of propagation is said to be polarized. Simple antenna may thus be horizontally or vertically polarised. More complex antennas may be circularly or elliptically polarised. For grounded vertical dipoles operated at frequencies upto the MF, the optimum effective height is just over a half-wavelength.

The Yagi-Uda antenna employ a folded dipole and parasitic elements to obtain reasonable gain in the HF and VHF ranges. High gain and narrow bandwidths are especially required of microwave antennas. Large number of microwave antennas incorporate the paraboloid reflector in their construction. Other microwave antennas are horns and lenses. A horn is an ideal for terminating a waveguide and may be conical, rectangular or sectorial. Dielectric lenses act on microwave radiation as do ordinary lenses on light. Wide band antennas are required either when the transmissions themselves are wideband or when working of narrow channel over a wide frequency range. Horns, the folded dipole and rhombic all have good broad band properties small loop antennas are often used for direction finding.

46. An ungrounded antenna near the ground
(A) acts as a single antenna of twice the height.
(B) is likely to need an earth mat.
(C) acts as an antenna array.
(D) must be horizontally polarised.

47. One of the following is very useful as a multiband HF receiving antenna. This is the
(A) Conical Horn
(B) Folded Dipole
(C) Log-Periodic
(D) Square Loop

48. Which of the following antenna is best excited from waveguide ?
(A) Biconical (B) Horn
(C) Helical (D) Discone

49. Indicate the antenna that is not wideband.
(A) Discone
(B) Folded Dipole
(C) Helical
(D) Marconi

50. An antenna that is circularly polarized is
(A) Helical
(B) Small circular loop
(C) Parabolic reflector
(D) Yagi-Uda

Space For Rough Work