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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)

D 8 8 1 1

Time : **1 $^{1}/_{4}$** 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. Which one of the following is a transferred electron device ?
(A) BARITT diode
(B) IMPATT diode
(C) Gunn diode
(D) Step recovery diode

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

3. Calculate the voltage drop across a 560 Ω resistance when the current flowing in it is 20 mA ?
(A) 2 V (B) 3 V
(C) 1.120 V (D) 1 mA

4. For 0 logic in TTL, the input voltage profile is
(A) 0 to 0.8 V (B) 0 to 0.4 V
(C) 0 V (D) 0 to 2 V

5. An interrupt, in which the external device supplies its address as well as the interrupt request, is known as
(A) vectored interrupt
(B) maskable interrupt
(C) polled interrupt
(D) non-maskable interrupt

6. Which is not a storage class in C ?
(A) Automatic (B) Register
(C) Static (D) Dynamic

7. Maxwell's contribution to ampere's law is given by
(A) $\nabla \cdot \vec{D} = \rho$
(B) $\nabla \times \vec{H} = \vec{J} + \frac{\partial \vec{D}}{\partial t}$
(C) $\nabla \times \vec{E} = -\frac{\partial \vec{B}}{\partial t}$
(D) $\nabla \cdot \vec{B} = 0$

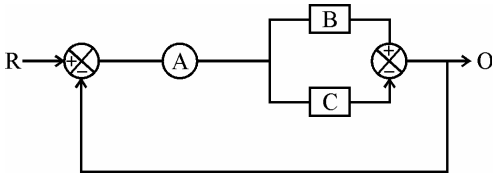
8. In a low level amplification modulation system, amplifiers, following the modulated stage must be
(A) Linear devices
(B) Harmonic devices
(C) Class C amplifiers
(D) Non-linear devices

9. The diameter of the core of single mode optical fiber is of the order of
(A) 50 µm (B) 250 µm
(C) 10 µm (D) 100 µm

10. The intrinsic stand-off ratio for a UJT is equal to
(A) 1 (B) < 1
(C) > 1 (D) 10

11. When the force is applied on a crystal the potential changes. This is called
(A) Piezo electric transducer
(B) Seeback effect
(C) Capacitive effect
(D) Inductive effect

12. The transfer function of the system show in the given figure is



(A) $\frac{O}{R} = \frac{ABC}{1 + ABC}$
(B) $\frac{O}{R} = \frac{A + B + C}{1 + AB + AC}$
(C) $\frac{O}{R} = \frac{AB + AC}{ABC}$
(D) $\frac{O}{R} = \frac{AB + AC}{1 + AB + AC}$

13. Ring counter is a
(A) Sequence generator
(B) Up counter
(C) Down counter
(D) Decade counter

14. The refractive index of the ionosphere for radio wave is
(A) < 1 (B) > 1
(C) $= 0$ (D) $= 1$

15. The memory addressing mode that takes the least time is
(A) direct addressing
(B) register addressing
(C) immediate addressing
(D) implicit

16. Gunn diode oscillators are used in microwave applications :
1. Low power oscillators
2. Medium power oscillators
3. Pump sources
4. Having higher noise

Of these statements :
(A) 1, 2, 3 are correct
(B) 2, 4 are correct
(C) 4, 1 are correct
(D) 2, 3 are correct

17. Consider the following statements : Laser is an acronym for light amplification by stimulated emission of radiation in comparison to LED, it has
1. higher emission efficiency.
2. narrow spectral width.
3. coherent.
4. spontaneous emission.

(A) 1, 2, 3 are correct
(B) 3, 4 are correct
(C) 1, 4 are correct
(D) 2, 4 are correct

18. The Hall effect experiment provides
1. Hall co-efficient.
2. Type of the charge carrier.
3. Mobility of the charge carrier.
4. Temperature of the material increases.

Of these statements,
(A) 1, 2, 4 are correct
(B) 1, 3, 4 are correct
(C) 1, 2, 3 are correct
(D) 2, 4, 3 are correct

19. Op-Amp has the following characteristics :
1. Zero off-set voltage
2. High CMRR
3. High input impedance
4. Zero slew rate

Of these statements :
(A) 1, 2, 3 are correct
(B) 2, 3, 4 are correct
(C) 1, 2, 4 are correct
(D) 3, 4, 1 are correct

20. Yagi-Uda Antenna is used as a
1. HF transmitting antenna.
2. VHF television receiving antenna.
3. it is having high gain in narrow band.
4. it is called as supergain antenna.

Of these statements :
(A) 1, 2, 3 are correct
(B) 2, 3, 4 are correct
(C) 3, 4, 1 are correct
(D) 1, 2, 4 are correct

Question Nos. **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 correct explanation of (A).
(C) (A) is true but (R) is false.
(D) (A) is false but (R) is true.

21. **Assertion (A) :** At room temperature, the fermi level in a p-type semiconductor lies nearer to the valence band whereas that in n-type semiconductor lies nearer to the conduction band.
Reason (R) : At room temperature, the p-type semiconductor has majority charge carrier are holes whereas the n-type semiconductor, the majority charge carriers are electrons.

22. **Assertion (A) :** Superposition theorem is a method of network analysis that permits considering the effects of each source independently.
Reason (R) : Thevenin's theorem permits the reduction of any two terminal linear ac network to one having a single voltage source and series impedance.

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

24. **Assertion (A) :** In Intel 8085, the lower byte of address and data are multiplexed.
Reason (R) : This helps limit the number of external pin terminals.

25. **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.

26. **Assertion (A) :** The top down structured programming should be used for developing programmes.
Reason (R) : The top down structured programming methodology enables us to get readable and easily provable program.

27. **Assertion (A) :** The port of root locus on the real axis is not dependent upon the poles and zeroes which are not on the real axis.
Reason (R) : Poles and zeros which are not on the real axis always occur in conjugate pairs.

28. **Assertion (A) :** Master-Slave JK flip-flop is free from race around condition.
Reason (R) : Master-Slave uses two J-K flip-flop.

29. **Assertion (A) :** A demultiplexer cannot be used as a decoder.
Reason (R) : A demultiplexer selects one of many output whereas a decoder selects an output corresponding to the coded output.

30. **Assertion (A) :** A processor can reference a memory stack without specifying an address.
Reason (R) : The address is always available and automatically updated in the stack pointer.

Sequence Type

31. The following components are used to measure the output power of a 2 kW travelling wave tube amplifier (TWTA)
I. TWTA
II. Low-pass filter/high pass filter
III. 40 dB directional coupler with matched load
IV. Power meter
The correct sequence of the connection of these components is
(A) I, II, III, IV (B) I, IV, III, II
(C) IV, II, I, III (D) II, III, IV, I

32. Each instruction in an assembly program has the following field :
I. Label field
II. Mnemonic field
III. Operand field
IV. Comment field
The correct sequence / order of these field is :
(A) I, III, II, IV (B) I, II, III, IV
(C) III, II, I, IV (D) II, III, I, IV

33. Consider the following logic families :

I. MOS II. DTL
III. RTL IV. ECL

The sequence of the logic families in the order of their increasing noise immunity is

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

34. Write down the following frequencies in increasing order :

I. K_u band II. X band
III. S band IV. UHF band

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

35. Consider the following devices :

I. BJT in CB mode
II. BJT in CE mode
III. JFET
IV. MOSFET

The correct sequence of these devices in increasing order of their input impedance is

(A) I, II, III, IV (B) II, I, III, IV
(C) II, I, IV, III (D) I, III, 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)	Wave no	(i)	$-\frac{\partial B}{\partial t}$
(b)	$\nabla \times \vec{E}$	(ii)	$\vec{J} + \frac{\partial \vec{D}}{\partial t}$
(c)	$\nabla \cdot B$	(iii)	0
(d)	$\nabla \times \vec{H}$	(iv)	$K = \frac{2\pi}{\pi}$

Codes :

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

37.

	List – I		List – II
(a)	Frequency modulation	(i)	Envelope detection
(b)	Double sideband suppressed signal carrier	(ii)	Companding
(c)	PCM	(iii)	Balanced modulator
(d)	Amplitude modulation	(iv)	Pre-emphasis and de-emphasis

Codes :

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

38.

	List – I		List – II
(a)	BJT	(i)	Voltage controlled negative resistance
(b)	MOSFET	(ii)	High current gain
(c)	Tunnel diode	(iii)	Voltage regulation
(d)	Zener diode	(iv)	High input impedance

Codes :

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

39.

	List – I		List – II
(a)	IC 8251	(i)	Minimum /maximum mode
(b)	IC 8086	(ii)	Programmable peripheral interface
(c)	IC 8255 A	(iii)	Micro controller
(d)	IC 8259 A	(iv)	Programmable interrupt controller

Codes :

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

40.

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

Codes :

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

41.

List – I Flags	List – II Bit-position
(a) Sign	(i) 5^{th} Bit
(b) Auxiliary carry	(ii) 8^{th} Bit
(c) Parity	(iii) 1^{st} Bit
(d) Carry flag	(iv) 3^{rd} Bit

Codes :

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

42.

List – I	List – II
(a) LASER	(i) Spontaneous emission
(b) Solar cell	(ii) Power delivers to load
(c) Photo diode	(iii) Optical detector
(d) LED	(iv) Stimulated emission

Codes :

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

43.

List – I	List – II
(a) Crystal oscillator	(i) Uses LC circuit
(b) UJT	(ii) Uses crystal instead of LC
(c) RC phase shift oscillator	(iii) Relaxation oscillator
(d) Tank circuit	(iv) 180° phase shift

Codes :

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

44.

List – I A/D converters	List – II Characteristics
(a) Parallel comparator	(i) Null balancing type
(b) Successive approximation	(ii) Fastest converter
(c) Dual slope	(iii) Voltage dependent conversion time
(d) Counter-ramp	(iv) Integrating type

Codes :

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

45.

List – I	List – II
(a) ASCII	(i) C^{++}
(b) Microprocessor	(ii) Mnemonics
(c) Assembly language	(iii) Op code
(d) Object oriented programming	(iv) 7-bit code

Codes :

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

Read the passage below and answer the questions (**46 – 50**) that follow based on your understanding of the passage.

The Reflex-Klystron is a low power, low efficiency oscillator. Reflex-Klystron with integral cavities are available for frequencies ranging from under 4GHz to over 200 GHz. A typical power output is 100 mW, but overall maximum powers range from 3 W in the X band to 10 mW at 220 GHz. Typical efficiencies are under 10 percent, restricting the oscillator to low-power applications. It has been seen that in Reflex-Klystron, velocity modulation is converted to current modulation in the repeller space and one bunch is formed per cycle of oscillations. For oscillations to be maintained, the transit time in the repeller space must have the correct value. It is also interesting to note that ideally no energy goes into velocity-modulating the electron beam. In Reflex Klystron the practical transit times corresponding to the range from $1\ ^3/_4$ to $6\ ^3/_4$ cycles of gap voltage.

The Klystron oscillator has been replaced by various semiconductor oscillators such as signal source. In microwave generators, local oscillators in microwave receivers are frequency-modulated oscillator in portable microwave links and pump oscillator for parametric amplifiers.

Additionally, the Reflex Klystron is still a very useful millimeter and sub millimeter oscillator producing more power at the highest frequencies then most semiconductor devices, with very low AM and FM noise.

46. Indicate the false statement. Klystron amplifiers may use intermediate cavities to

(A) prevent the oscillations that occur in two-cavity Klystrons.

(B) increase the bandwidth of the device.

(C) improve the power gain.

(D) increase the efficiency of the Klystron.

47. The transit time in the repeller space of a reflex Klystron must be $n + \frac{3}{4}$ cycles to ensure that

(A) electrons are accelerated by the gap voltage on their return.

(B) returning electrons give energy to the gap oscillations.

(C) it is equal to the period of the cavity oscillations.

(D) the repeller is not damaged by striking electrons.

48. Indicate the false statement. Transit time in microwave tubes will be reduced if

(A) the electrodes are brought closer together.

(B) a higher anode current is used.

(C) multiple or coaxial leads are used.

(D) the anode voltage is made larger.

49. X-band frequencies falls in the range of

(A) 10 GHz to 15 GHz

(B) 11 GHz to 15 GHz

(C) 8 GHz to 12 GHz

(D) 7 GHz to 11 GHz

50. The Klystron oscillator is superior to other semiconductor oscillators. Indicate the false statement.

(A) signal source in microwave generator.

(B) local oscillator in microwave receivers.

(C) pump oscillator for parametric amplifier.

(D) amplitude-modulated oscillator in portable microwave links.