Signature and Name of Invigilator

1. (Signature) _____
   (Name) _____

2. (Signature) _____
   (Name) _____

(To be filled by the Candidate)

Roll No. | | | | | | |

(In figures as per admission card)

Roll No. _____

(In words)

Test Booklet No.

| J – 8808 |

PAPER – II

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

Number of Pages in this Booklet : **16**   Number of Questions in this Booklet : **50**

Instructions for the Candidates	परीक्षार्थियों के लिए निर्देश
1. Write your roll number in the space provided on the top of this page.	1. पहले पृष्ठ के ऊपर नियत स्थान पर अपना रोल नम्बर लिखिए।
2. This paper consists of fifty multiple-choice type of questions.	2. इस प्रश्न-पत्र में पचास बहुविकल्पीय प्रश्न हैं।
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 :	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) 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.	(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) **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.**	(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) 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.	(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. 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.	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. 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.	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 हैं, तो उसका मूल्यांकन नहीं होगा।
6. Read instructions given inside carefully.	6. अन्दर दिये गये निर्देशों को ध्यानपूर्वक पढ़ें।
7. Rough Work is to be done in the end of this booklet.	7. कच्चा काम (Rough Work) इस पुस्तिका के अन्तिम पृष्ठ पर करें।
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.	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. 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.	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. **Use only Blue/Black Ball point pen.**	10. केवल नीले / काले बाल प्वाईंट पैन का ही इस्तेमाल करें।
11. **Use of any calculator or log table etc., is prohibited.**	11. किसी भी प्रकार का संगणक (कैलकुलेटर) या लाग टेबल आदि का प्रयोग वर्जित है।
12. **There is NO negative marking.**	12. गलत उत्तर के लिए अंक नहीं काटे जायेंगे।

ELECTRONIC SCIENCE

PAPER—II

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

1. What is the type of capacitance effect exhibited by the PN junction, when it is reversed biased ?

   (A) Transition capacitance   (B) Diffusion capacitance

   (C) Space charge capacitance   (D) Drift capacitance

2. Recombination of electrons and holes takes place when :

   (A) An electron from conduction band falls into a hole in valence band

   (B) A positive ion and a negative ion bond together

   (C) Avalanche electron becomes a conduction electron

   (D) An atom is formed

3. X_L is :

   (A) directly related to frequency

   (B) directly related to inductance

   (C) directly related to both frequency and induction

   (D) none of the above

4. In a purely inductive circuit :

   (A) voltage lags current by 90°   (B) current lags voltage by 90°

   (C) voltage and current are in phase   (D) voltage and current are not in phase

5. The PPM can be converted into PDM by modifying the circuit of :

   (A) Monostable multivibrator   (B) Astable multivibrator

   (C) Bistable multivibrator   (D) All the above

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

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

7. A toggle operation is used :

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

(C) without a flip-flop   (D) none of the above

8. In a bistable multivibrator, commutating capacitors are used to :

(A) increase the base storage charge   (B) provide ac coupling

(C) increase the speed of response   (D) alter the frequency of the output

9. In 8085 microprocessor, the value of the most significant bit of the result following the execution of any arithmetic of Boolean instruction is stored in the :

(A) carry status flag   (B) auxiliary carry status flag

(C) sign status flag   (D) zero status flag

10. The interface chip is used for data transmission between 8086 and a 16 - bit ADC is :

(A) 8259   (B) 8255   (C) 8253   (D) 8251

11. Consider the following statements :

(i) An assembly language program runs faster than a high level language program to produce the desired result.

(ii) An assembler which runs on a computer for which it produces object codes is called a resident assembler.

(iii) A cross-assembler is an assembler that runs on a computer other than that for which it produces machine codes.

(iv) A one-pass assembler reads the assembly language programs only once.

Which of these statements are correct ?

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

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

12. 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

13. Modulation is a process of :

(A) reducing distortion

(B) improving thermal stability

(C) combining audio and radio frequency waves at the transmitter

(D) generating constant frequency waves

14. Transmission of signals in a terrestrial microwave system is achieved through :

(A) reflection from the ionosphere   (B) line-of-sight mode

(C) reflection from the ground   (D) diffraction from the stratosphere

15. Consider the following statements :

(i) The derivative control improves the overshoots of a given system.

(ii) The derivative control reduces steady-state error.

(iii) Integral control reduced steady-state error.

(iv) Integral control does not affect stability.

Of these statements :

(A) (i) and (iii) are correct   (B) (i) and (ii) are correct

(C) (ii) and (iv) are correct   (D) (ii) and (iii) are correct

16. 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) $\dfrac{log_2 m}{m}$

(C) $\dfrac{2}{log_2 m}$

(D) $\dfrac{log_2 m}{2}$

17. A relaxation oscillator is one which :

(A) oscillates continuously

(B) has two stable states

(C) relax indefinitely

(D) produces non-sinusoidal output

18. When a plane wave propagating through free space, the direction of the field :

(i) 'E' is perpendicular to the direction of propagation

(ii) 'H' is perpendicular to the direction of propagation

(iii) 'E' is perpendicular to the direction of the field 'H'

Codes :

(A) (i) and (ii)

(B) (ii) and (iii)

(C) (i) and (iii)

(D) (i), (ii) and (iii)

19. Which one of the following is capable of giving the highest data speed ?

(A) Coaxial cable link

(B) Microwave LOS link

(C) Microwave satellite system

(D) Optical fiber system

20. Quantizing noise occurs in :

(A) Time-division multiplexing

(B) Frequency-division multiplexing

(C) Pulse-code modulation

(D) Pulse-width modulation

(Questions 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 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 the 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 the n-type semiconductor lies nearer to the conduction band.

    Reason (R) : At room temperature, the p-type semiconductor is rich in holes whereas the n-type semiconductor is rich in electronics.

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) :* 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.

24. *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.

25. *Assertion (A) :* The transient performance of a feedback control system is normally analyzed by using a unit-step function as the reference input.

Reason (R) : Unit step function is the most common input found in practice.

26. *Assertion (A) :* Thyristors are preferred to power diodes in variable power rectifiers.

Reason (R) : Thyristors provide controlled rectification and also the power loss in them is less compared to that in power diodes.

27. *Assertion (A) :* Stimulated emission is the key to the operation of LASER.

Reason (R) : An important property of laser radiation is its coherence, under which is meant the corelation between the phases of oscillation at different positions in space and at various moments of time.

28. *Assertion (A) :* A half-adder is faster than full-adder.

Reason (R) : A half adder gives only one output while a full adder gives two outputs.

29. *Assertion (A) :* Optical fibers have broader bandwidth to conventional copper cables.

Reason (R) : The information carrying capacity of optical fibers is limited by Rayleigh scattering loss.

30. *Assertion (A) :* If a semiconductor is placed in a transverse magnetic field B, and an electric field E is applied across its other two faces, then it would produce an electric current I, in the direction perpendicular to both B and E.

Reason (R) : Hall coefficient is proportional to the mobility of charge carriers in the semiconductor.

31. 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), (iv), (i)

32. The Microprocessor chips available with different speed are :

(i) 8085

(ii) 80286

(iii) 8086

(iv) 80486

Codes :

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

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

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

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

34. Consider the Analog to Digital converters given below :

(i) Successive approximation ADC

(ii) Dual-slope ADC

(iii) Counter method ADC

(iv) Simultaneous ADC

The correct sequence of the ascending order in terms of speed of the above ADC's is :

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

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

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

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

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 list :

	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)	*(iv)*	*(iii)*	*(ii)*	*(i)*
(B)	*(iii)*	*(ii)*	*(i)*	*(iv)*
(C)	*(iv)*	*(i)*	*(iii)*	*(ii)*
(D)	*(iii)*	*(i)*	*(iv)*	*(ii)*

37. Match *List-I* with *List-II* :

List-I

(a) Flip-Flop can be used as latch

(b) Flip-Flop can be used as delayed

(c) Flip-Flop does not have race problem

(d) Flip-Flop can be used as shift registers

List-II

(i) D-Flip-Flop

(ii) Master-slave

(iii) JK

(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)*

38. Match *List-I* with *List-II* :

List-I

(a) BJT

(b) FET

(c) SCR

(d) Tunnel diode

List-II

(i) Pinch off effect

(ii) Controlled rectification

(iii) Negative resistance characteristics

(iv) Punch through effect

Codes :

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

39. Match *List-I* with *List-II* :

	List-I		*List-II*
(a)	SID, SOD	(i)	Wait state
(b)	READY	(ii)	Interrupt
(c)	TRAP	(iii)	Serial data transfer
(d)	ALE	(iv)	Address latch control

Codes :

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

40. Match *List-I* with *List-II* :

	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)*

41. Match *List-I* with *List-II* :

List-I		*List-II*	
(a)	Frequency modulation	(i)	Envelop detection
(b)	Double sideband suppressed singal carrier	(ii)	Companding
(c)	PCM	(iii)	Balance modulator
(d)	Amplitude modulation	(iv)	Pre-emphasis and de-emphasis

Codes :

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

42. Match *List-I* with *List-II* :

List-I		*List-II*	
(a)	Solar cell	(i)	Delivers power to a load
(b)	LASER	(ii)	Spontaneous emission
(c)	Photodiode	(iii)	Detects light incident upon it
(d)	LED	(iv)	Stimulated emission

Codes :

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

43. Match *List-I* with *List-II* :

    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)*

44. Match *List-I* with *List-II* :

    List-I   *List-II*

    (a) Monostable multivibrator   (i)   no-stable state

    (b) Astable multivibrator   (ii)   one-stable state

    (c) Free-running multivibrator   (iii) two-stable state

    (d) Bi-stable multivibrator   (iv)   alternate high and low output

    Codes :

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

45. Match *List-I* with *List-II* :

   List-I

   (a)   Single mode optical fiber
   (b)   Multi-mode optical fiber
   (c)   Graded index optical fiber
   (d)   Simple glass rod fiber

   List-II

   (i)   data rate is lowest
   (ii)   data rate is highest
   (iii) data rate is medium
   (iv)   data transfer not possible

   Codes :

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

Read the passage and answer the questions that follow based on your understanding of the passage :

   Like a transmission line, an antenna is a device with distributed constants, so that current, voltage and impedance all vary from one point to the next one along it. This factor must be taken into account when considering important antenna properties are expressed in terms of those of comparison antennas. Useful comparison antenna is the elementary doublet. This is defined as a piece of infinitely thin wire with a length that is negligible compared to the wavelength of signal being radiated, and having constant current along it. Long thin wires which are often used in practice. This may be resonant which effectively means that their length is multiple of half-wavelength of the signal or non-resonant in which case the reflected wave have been suppressed. The resonant antennas are bidirectional but non-resonant antennas are unidirectional since there is no reflected waves.

   Simple antennas are horizontally on vertically polarized. More complex antennas are may be circularly polarized.

   The Yagi-uda antenna employs a folded dipole and parasitic element to obtain reasonable gain the HF and VHF ranges. The rhombic antenna is a non-resonant antenna providing excellent gain in HF range. High gain and narrow bandwidth are special requirement of microwave antennas. The microwave antennas are horn and lenses. A horn is an ideal antenna for terminating a waveguide and may be conical or rectangular. Wideband antennas are required in transmission of narrow channels over a wide frequency range. The folded dipole (hence Yagi-uda antenna) and the rhombic all have good broad band properties - Helical antenna is circularly polarized and hence ideal for transionospheric communication. When multiactive bandwidths are required, the antennas used often have constant angle feature. One such antenna is discone. Which is low gain multiactive and normally used in ultrahigh frequency range.

46. Which one of the following consists of non-resonant antennas ?

   (A)   The rhombic antenna   (B)   The folded dipole
   (C)   The end-fire array   (D)   The broad side array

47. An antenna that is circularly polarized is the :

(A) helical   (B) small circular loop

(C) parabolic reflector   (D) yagi-uda

48. Which one of the following terms does not apply to the Yagi-uda array ?

(A) good band width   (B) parasitic element

(C) folded dipole   (D) high gain

49. One of the following is very useful as a multiband UHF receiving antenna. This is :

(A) Discone antenna   (B) Folded dipole

(C) Log periodic   (D) Square loop

50. Which of the following antennas is best excited from a wave-guide ?

(A) Biconical   (B) Horn

(C) Helical   (D) Discone

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Space For Rough Work