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 | 4 |

Time : **1 ¼ hours**]

[Maximum Marks : **100**

Number of Pages in this Booklet : **12**	Number of Questions in this Booklet : **50**
Instructions for the Candidates	**परीक्षार्थियों के लिए निर्देश**

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 circle as indicated below on the correct response against each item.
   Example : Ⓐ Ⓑ ● Ⓓ
   where (C) is the correct response.
5. Your responses to the items are to be indicated in the **OMR Sheet given inside the Paper I Booklet only.** If you mark at any place other than in the circle in the OMR 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 OMR 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 such as change of response by scratching or using white fluid, you will render yourself liable to disqualification.
9. You have to return the test question booklet and Original OMR Sheet to the invigilators at the end of the examination compulsorily and must not carry it with you outside the Examination Hall. You are, however, allowed to carry original question booklet and duplicate copy of OMR Sheet on conclusion of examination.
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. इस 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 वृत्त को पेन से भरकर काला करना है जैसा कि नीचे दिखाया गया है ।
   उदाहरण : Ⓐ Ⓑ ● Ⓓ
   जबकि (C) सही उत्तर है ।
5. प्रश्नों के उत्तर **केवल प्रश्न पत्र I के अन्दर दिये गये OMR पत्रक पर ही** अंकित करने हैं । यदि आप OMR पत्रक पर दिये गये वृत्त 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 OMR पत्रक 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, जैसे कि अंकित किये गये उत्तर को मिटाना या सफेद स्याही से बदलना तो परीक्षा के लिये अयोग्य घोषित किये जा सकते हैं ।
9. आपको परीक्षा समाप्त होने पर प्रश्न-पुस्तिका एवं मूल OMR पत्रक निरीक्षक महोदय को लौटाना आवश्यक है और परीक्षा समाप्ति के बाद उसे अपने साथ परीक्षा भवन से बाहर न लेकर जायें । हालांकि आप परीक्षा समाप्ति पर मूल प्रश्न-पुस्तिका तथा OMR पत्रक की डुप्लीकेट प्रति अपने साथ ले जा सकते हैं ।
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 नकारात्मक अंक नहीं हैं ।

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P.T.O.

ELECTRONIC SCIENCE
Paper – II

Note : This paper contains **fifty (50)** objective type questions of **two (2)** marks each. **All** questions are compulsory.

1. The threshold voltage of an n-channel MOSFET can be increased by
   (A) increasing the channel dopant concentration
   (B) reducing the channel dopant concentration
   (C) reducing the gate oxide thickness
   (D) reducing the channel length

2. The Thevenin's equivalent across AB is

   (A) 6 V, 2 Ω   (B) 9 V, 1 Ω

   (C) 12 V, 4 Ω   (D) 18 V, 2 Ω
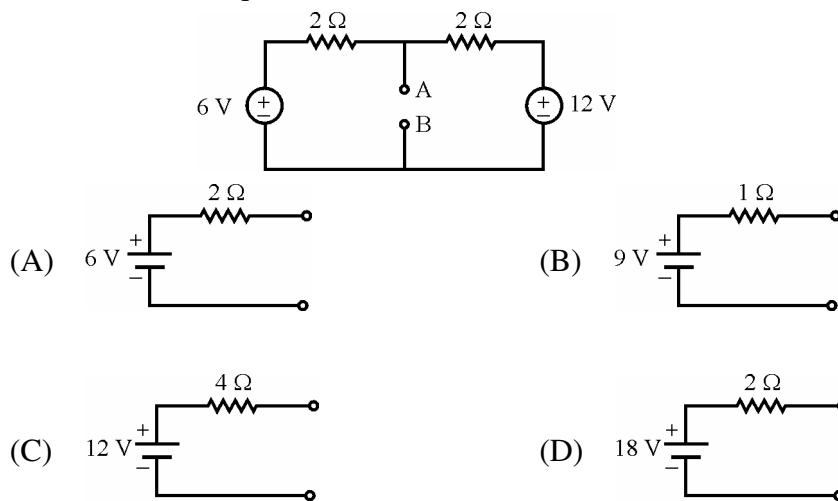
3. The input to a differentiator is –5 V. Its output will be
   (A) square wave   (B) 0 V
   (C) +5 V   (D) sine wave

4. In successive approximation converter input to the comparator is through
   (A) DAC   (B) Latch
   (C) Flip-flop   (D) Sample and hold circuit

5. The assembler directive used to give name to some value or symbol for 8086 ASM-86 is
   (A) DD   (B) NAME
   (C) EQU   (D) PROC

6. Which of the following is not an infinite loop ?

(A) int i = 1;

    while (1)

    {

        i ++

    }

(B) for (; ;) ;

(C) int t = 0, f ;

    while (t)

    {

        f = 1;

    }

(D) int y, $x = 0$;

    do

    {

    y = x;

    }

    while ($x = = 0$);

7. In a two cavity Klystron the secondary cavity is called

(A) Buncher

(B) Velocity modulation

(C) Coupled cavity

(D) Catcher

8. In FM

(A) carrier never becomes zero

(B) J-coefficient occasionally are negative

(C) total power remains constant with respect to modulation index

(D) pulse rate decreases

9. In thyristor $\dfrac{di}{dt}$ failure is prevented by
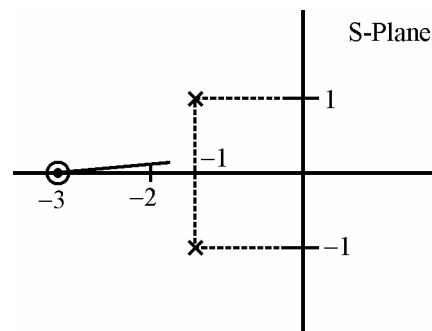
(A) putting L in series with anode

(B) putting R in series with anode

(C) putting C in series with anode

(D) putting RC in series with anode

10. The driving point impedance Z(s) of a network has pole – zero plot as shown, if Z(0) = 3, then Z(s) = ?

(A) $Z(s) = 3(s + 3) / s^2 + 2s + 3$

(B) $Z(s) = 2(s + 3) / s^2 + 2s + 2$

(C) $Z(s) = 3(s - 3) / s^2 + 2s + 2$

(D) $Z(s) = 2(s - 2) / s^2 + 2s + 2$

11. The C.E. configuration is normally preferred because it provides :
   i.   voltage gain
   ii. current gain
   iii. power gain
   iv. stability
   Which is correct ?
   (A) i, ii   (B) i, ii, iii
   (C) ii, iii   (D) ii, iii, iv

12. An element between the two terminals of a network to which a connection can be made is called _____ while the branches of the tree are called _____
   i.   branch
   ii. node
   iii. twig
   iv. loop
   Which is correct ?
   (A) i, ii   (B) ii, iii
   (C) iii, iv   (D) i, iv

13. Consider the following statements regarding an RC phase shift oscillator :
   i.   amplifier gain is positive.
   ii. amplifier gain is negative.
   iii. phase shift introduced by the feedback network is 180°.
   iv. phase shift introduced by the feedback network is 360°.
   Which is correct ?
   (A) i, ii   (B) ii, iii
   (C) i, iii   (D) i, iv

14. Read the following statements :
   i.   Gate is a combinational logic.
   ii. JK Flip-flop in toggle mode is not combinational logic.
   iii. MSJK FF suffers from race-around.
   iv. Counters are sequential circuits.
   Which is correct ?
   (A) i, ii   (B) i, ii, iv
   (C) ii, iii, iv   (D) i, ii, iii

15. Which of the following peripherals provide I/O facilities ?
   i.   8279   ii. 8155
   iii. 8259   iv. 8255
   (A) i, ii   (B) ii, iii
   (C) iii, iv   (D) ii, iv

16. The three types of loops available in C language are
i.   for
ii. while
iii. do-while
Which loops do not operate without testing the condition even once ?
(A) i, iii   (B) i, ii
(C) ii, iii   (D) i, ii, iii

17. A PIN diode can not be used as
i.   Microwave switch
ii. Microwave mixer
iii. Microwave detector
Which is correct ?
(A) i, ii   (B) ii, iii
(C) i, iii   (D) i, ii, iii

18. Read the statements :
i.   DSB has two side bands and SSB has one
ii. DSB has carrier and two side bands and SSB has a carrier and a side band
iii. DSB has carrier and two side bands and SSB without carrier and two different side bands.
Which statements are correct ?
(A) i, ii   (B) ii, iii
(C) i, iii   (D) i, ii, iii

19. Which of the following are bidirectional devices ?
i.   SCR   ii. TRIAC
iii. DIAC   iv. SCS
(A) i, ii   (B) ii, iii
(C) ii, iv   (D) i, iv

20. Which of the following transducers are not linear ?
i.   thermistor
ii. thermocouple
iii. IC sensor
(A) i, ii   (B) ii, iii
(C) i, iii   (D) i, ii, iii

21. Which one of the following is not LED material ?
1.   Ga As   2.   Ga P
3.   Si   4. SiO_2
(A) 1 & 2   (B) 2 & 3
(C) 3 & 4   (D) 1 & 4

22. Which of the following quantities can not be measured/determined using HALL effect ?
1.   Type of semiconductor (p or n)   2.   Band gap
3.   Diffusion constant   4.   Carrier concentration
(A) 1 & 2   (B) 2 & 3
(C) 1 & 4   (D) 1 & 3

23. Which of the following are not the parts of an AM superheterodyne receiver ?
1. De-emphasis network   2. Mixer
3. IF Amplifier   4. Limiter
(A) 1 & 2   (B) 1 & 3
(C) 1 & 4   (D) 2 & 4

24. The following is true for the multimode graded index fiber :
1. The refractive index varies as a function of radial distance from the centre.
2. The refractive index undergoes sudden change at the cladding boundary.
3. It provides better bandwidth and the data rate than the multimode step index.
4. It provides the better bandwidth and data rate than single mode step index.
(A) 1 & 3   (B) 2 & 4
(C) 1 & 4   (D) 3 & 4

25. A MOSFET differs from the JFET because
1. of the characteristics   2. the MOSFET has two gates
3. the JFET has p-n junctions 4. of the physical reduced size
(A) 1 & 2   (B) 1 & 3
(C) 1 & 4   (D) 2 & 3

26. Match the following :

	List – I		**List – II**
a.	n * p	i.	26 mV/I
b.	p-n diode	ii.	$\frac{2}{|V_p|}\sqrt{I_{DS} \cdot I_{DSS}}$
c.	JFET	iii.	$I_D = K(V_{GS} - V_{GST})^2$
d.	enhancement MOSFET	iv.	mass action law

Codes :

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

27. Match the following :

	List – I		**List – II**
a.	n-parameters	i.	O/P voltage varies as the slope of i/p voltage
b.	differentiator	ii.	Noise division
c.	half-wave rectifier	iii.	Function of a Q point
d.	integrator	iv.	series diode clipper

Codes :

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

28. Match the following :

	List – I		**List – II**
a.	voltage shunt negative feedback	i.	increase of CMRR
b.	constant current source differential amplifier	ii.	O/P voltage attenuated by a factor 1/29
c.	Phase shift oscillator	iii.	FSK decoder
d.	PLL	iv.	decrease of O/P impedance

Codes :

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

29. Match the following :

	List – I		**List – II**
a.	I^2L	i.	XOR
b.	high impedance state	ii.	non-saturation logic
c.	controlled inverter	iii.	tristate
d.	ECL	iv.	bipolar logic

Codes :

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

30. Match the following :

	List – I		**List – II**
a.	8086	i.	128 byte RAM
b.	8051	ii.	2-key lockout
c.	8279	iii.	3-chip configuration
d.	8085	iv.	maximum mode

Codes :

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

31. Match the following :

	List – I		**List – II**
a.	associativity	i.	memory storage
b.	# define	ii.	if-then-else
c.	auto	iii.	operators with equal precedence
d.	conditional operator	iv.	define operator

Codes :

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

32. Match the following :

	List – I		**List – II**
a.	DSB-SC modulation	i.	envelope detection
b.	SSB-modulation	ii.	Foster Seeley
c.	AM-demodulation	iii.	Weaver's method
d.	Phase-shift detection	iv.	Balanced modulator

Codes :

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

33. Match the following :

	List – I		**List – II**
a.	Snubber circuit	i.	SCR
b.	Inverter	ii.	High efficiency
c.	Phase control	iii.	$\dfrac{dv}{dt}$ protection
d.	SMPS	iv.	UJT

Codes :

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

34. Match the following :

	List – I		**List – II**
a.	Miller sweep in CRO	i.	storage oscilloscope
b.	Study of transients	ii.	integrator
c.	Kokrotkoff sound	iii.	phase measurement
d.	Lissajous pattern	iv.	blood pressure

Codes :

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

35. Match the following :

	List – I		List – II
a.	Power efficient transmission	i.	SSB-SC
b.	Most bandwidth efficient transmission of voice signal	ii.	VSB
c.	Simplest receiver	iii.	FM
d.	Bandwidth efficient transmission of signals with significant d.c. component	iv.	AM

Codes :

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

Directions : Q. Nos. 36 to 45 :

The following items consist of two statements, one labelled as "Assertion (A)" and the other labelled as the "Reason (R)". You are to examine the 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 answer 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 the correct explanation of (A).

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

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

36. **Assertion (A) :** MOS ICs based on MOSFET structure find wide applications in digital field.

   Reason (R) : MOS ICs have small size and are easy to fabricate.

37. **Assertion (A) :** The series pass transistor in a regulator is in class A mode.

   Reason (R) : Class A is a switching mode and yields high efficiency.

38. **Assertion (A) :** The most commonly used amplifier in S/H circuit is unity gain NINV amplifier.

   Reason (R) : At the sampling state signal building is not desired.

39. **Assertion (A) :** In some applications it is required to delay pulse train by some number of clock periods.

   Reason (R) : For delay operation serial in parallel out shift registers are useful.

40. **Assertion (A) :** Interfacing is a technique to make operation of peripheral or I/O device compatible with that of a micro-processor.
    Reason (R) : Some peripherals and I/O devices are not TTL compatible.

41. **Assertion (A) :** 'C' uses many data types such as integers (short and long) and float etc.
    Reason (R) : Conversion specifier used for short unsigned integer is % lu.

42. **Assertion (A) :** The two types of optical sources used in transmitter of optical communication link are LED and LASER.
    Reason (R) : LASERs are costly hence not preferred for small distance low cost systems.

43. **Assertion (A) :** In applications such as FM and FSK, VCO plays an important role.
    Reason (R) : The frequency control is easily possible by varying d.c. voltage.

44. **Assertion (A) :** SCR and SCS belong to the thyristor category.
    Reason (R) : What distinguishes SCS from SCR is that SCS is two gate device.

45. **Assertion (A) :** Oscilloscope provides graphical representation of time varying signals.
    Reason (R) : Bandwidth is the limitation of oscilloscope.

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

Optical fibre communication is one among the new techniques have come up and are extensively used for communication purposes. The portion of the e.m. spectrum encompasses the optical region falls in the wavelength of 50 nm (Ultraviolet) to approximately 100 μm (Infrared) which includes visible light spectrum from 400 nm (Violet) to 700 nm (Red). The order of frequency corresponding to these wavelengths falls in the range 10^{14} to 10^{18} Hz. There are two types of transmission media used for optical communication i.e., atmospheric channel and guided wave channel. Out of the two, guided wave channel provide much more reliable and versatile medium of communication. The medium used for guided channels in optical range are non-metallic guides popularly known as optical fibre. The optical fibre link used for communication applications has several advantages over conventional cupper cable links which makes possible to send much more data over long distances with negligible attenuation. Although some difficulties do exist in the making of optical fibre set and there are some challenges being faced yet this type of communication mechanism has made a great impact in the present scenario.

46. A multimode step-index fibre has glass core ($n_1 = 1.5$) and fused quartz cladding ($n_2 = 1.46$), which one of the following is the value of acceptance angle ?

    (A) 20.2° (B) 21.2°
    (C) 22.2° (D) 76.7°

47. Following is not the usual classification of an optical fibre :
    (A) single mode step index
    (B) single mode graded index
    (C) multimode step index
    (D) multimode graded index

48. When atoms in Direct bandgap semiconductors move from higher energy state (E_2) to lower energy state (E_1) and emission of light takes place, the energy of emitted photon is given as
    (A) $h\,v_{12} = E_2 - E_1$
    (B) $h\,v_{12} = \dfrac{E_2}{E_1}$
    (C) $h\,v_{12} > E_2 - E_1$
    (D) $h\,v_{12} < E_2 - E_1$

49. Which of the following are the cases of signal attenuation ?
    1. Splicing
    2. Intermodal Delay
    3. Scattering
    4. Chromatic Dispersion
    (A) 1 & 3
    (B) 2 & 3
    (C) 1 & 4
    (D) 2 & 4

50. The following are correct about a semiconductor LASER :
    1. It requires population inversion
    2. It has shorter lifetime than LED
    3. It demonstrates spontaneous emission phenomenon
    4. It generates monochromatic incoherent light.
    Find out the correct answer :
    (A) 1 & 2
    (B) 1 & 3
    (C) 1 & 4
    (D) 2 & 4

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Space For Rough Work