D	8	8	1	5

PAPER - III

Time : 2½ hours]

ELECTRONIC SCIENCE

[Maximum Marks : 150

Number of Pages in this Booklet : 24	Number of Questions in this Booklet : 75

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 seventy five 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 on the OMR Sheet and the OMR Sheet Number should be entered on this Test Booklet.
4. Each item has four alternative responses marked (1), (2), (3) and (4). You have to darken the circle as indicated below on the correct response against each item.
   Example : ① ② ● ④ where (3) is the correct response.
5. Your responses to the items are to be indicated in the **OMR Sheet given inside the Booklet only.** If you mark your response 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 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 are 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 पचहत्तर 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 पुस्तिका 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 का नंबर OMR पत्रक पर अंकित करें और OMR पत्रक का नंबर इस प्रश्न-पुस्तिका पर अंकित कर दें।
4. प्रत्येक प्रश्न के लिए चार उत्तर विकल्प (1), (2), (3) तथा (4) दिये गये हैं। आपको सही उत्तर के वृत्त को पेन से भरकर काला करना है जैसा कि नीचे दिखाया गया है।
   उदाहरण : ① ② ● ④ जबकि (3) सही उत्तर है।
5. प्रश्नों के उत्तर **केवल प्रश्न पुस्तिका 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 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।

ELECTRONIC SCIENCE
PAPER - III

Note : This paper contains **seventy five (75)** objective type questions of **two (2)** marks each. **All** questions are **compulsory**.

1. For the n-channel MOSFET shown in the figure given below, threshold voltage $V_{th} = 2$ V. The drain current I_D of the MOSFET is 4 mA when the drain resistance R_D is 1 kΩ. If the value of R_D is increased to 4 kΩ, then the drain current I_D will become :
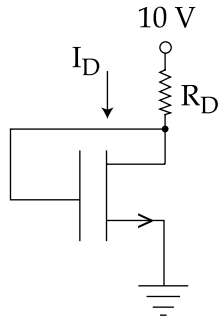
   (1) 2.8 mA   (2) 2.0 mA   (3) 1.4 mA   (4) 1.0 mA

2. In an npn diffused junction transistor, the p-type base region is formed on the n-type collector region through the process of :
   (1) Alloying
   (2) Epitaxial layer growth
   (3) Diffusion of P-type of impurity
   (4) Change of nature of doping during Crystal Growth

3. The average value of a periodic trapezoidal waveform is given by :
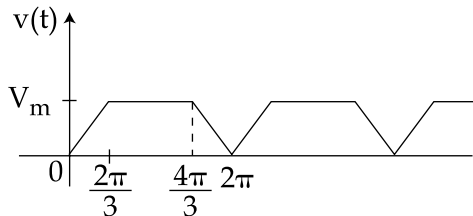
   (1) $V_{av}(t) = \dfrac{2}{3} V_m$ (2) $V_{av}(t) = \dfrac{1}{3} V_m$

   (3) $V_{av}(t) = V_m$ (4) $V_{av}(t) = 1.5 V_m$

4. The circuit shown below, will act as an ideal current source with respect to terminals A and B when frequency is :
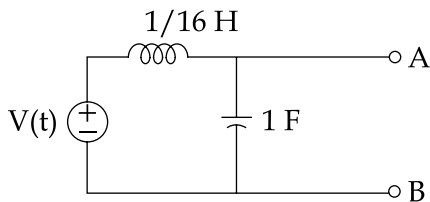
   (1) 1 rad/sec   (2) 0   (3) 16 rad/sec   (4) 4 rad/sec

5. If a certain oscillator, $A_v = 50$, the attenuation of the feedback circuit must be :

(1)   1   (2)   0.01   (3)   10   (4)   0.02

6. In circuit shown in the figure, if input voltage V_i is 0.2 V, then the output voltage V_o is :
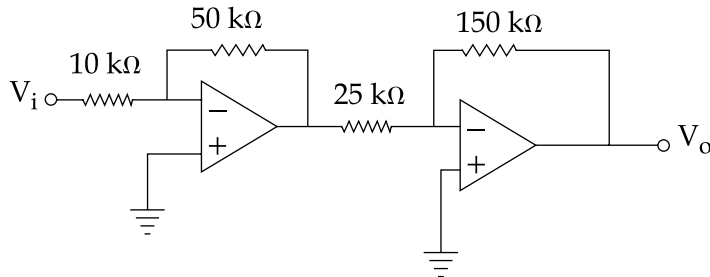
(1)   6 V   (2)   −6 V   (3)   8 V   (4)   −8 V

7. Which of the following A/D convertor is fastest ?

(1)   Flash convertor   (2)   Successive approximation

(3)   Counter ramp   (4)   Dual slope

8. For wired AND connection we should use :

(1)   TTL gates with active pull up

(2)   TTL gates with open collector

(3)   TTL gates without active pull up and with open collector

(4)   Any of the above

9. The 8085 assembly language instruction that stores the content of H and L register into the memory locations 2051_H and 2050_H respectively is :

(1)   SPHL 2050_H (2)   SPHL 2051_H (3)   SHLD 2050_H (4)   STAX 2050_H

10. Consider the following instructions of 8085 microprocessor.

Which of these causes the change in status of flag (s) ?

(1)   MOV M, A   (2)   CMP M

(3)   MVI A, FF   (4)   None of the above

11. A member of a structure object can be accessed through a pointer to the structure object by using :

(1)   Dot operator (·)   (2)   Arrow operator ($\rightarrow$)

(3)   Dereference operator (&)   (4)   None of the above

12. The value returned by the strlen function when a string literal constant is given to it as an argument is :

    (1) One more than the number of characters in the string argument

    (2) Same as the number of characters in the string argument

    (3) One less than the number of characters in the string argument

    (4) None of the above

13. For a quarter wave ideal transmission line of characteristic impedance of 50 Ω and load impedance of 100 Ω, the input impedance of line will be :

    (1) 50 Ω　　　　(2) 25 Ω　　　　(3) 100 Ω　　　　(4) 175 Ω

14. A TEM wave impinges obliquely on a dielectric - dielectric boundary with $\epsilon r_1 = 2$ of one medium and $\epsilon r_2 = 1$ of another medium. The value of angle of incidence for total internal reflection is :

    (1) 45°　　　　(2) 30°　　　　(3) 60°　　　　(4) 75°

15. A power signal $f(t)$ has a power spectral density defined as $S_f(\omega) = \dfrac{n}{A^2}$ for $|\omega < B|$.

    The power spectral density of $\dfrac{d f(t)}{dt}$ will be :

    (1) $\dfrac{\pi^2 \omega^2 A^2}{4n}$　　　　(2) $\dfrac{4\pi^2 \omega^2 A}{n}$　　　　(3) $\dfrac{\omega^2 n}{A^2}$　　　　(4) $\dfrac{\pi^2 \omega n}{A}$

16. The Rayleigh distribution of a random variable x is defined as :

    (1) $f_x(x) = \begin{cases} \dfrac{x}{\sigma} \, e^{\frac{-x^2}{2\sigma^2}} & ; x \geqslant 0 \\ 0 & ; \text{otherwise} \end{cases}$ 　　　　 (2) $f_x(x) = \begin{cases} \dfrac{x}{\sigma^2} \, e^{\frac{-x^2}{2\sigma^2}} & ; x \geqslant 0 \\ 0 & ; \text{otherwise} \end{cases}$

    (3) $f_x(x) = \begin{cases} \dfrac{x}{\sigma^2} \, e^{\frac{-x^2}{2\sigma}} & ; x \geqslant 0 \\ 0 & ; \text{otherwise} \end{cases}$ 　　　　 (4) $f_x(x) = \begin{cases} \dfrac{x^2}{2\sigma^2} \, e^{\frac{-x^2}{\sigma^2}} & ; x \geqslant 0 \\ 0 & ; \text{otherwise} \end{cases}$

17. A fiber has a core radius of 6 μm, operating wavelength = 1550 nm. The V-number of the fiber is given by :

    (1) 2.756　　　　(2) 2.956　　　　(3) 4.104　　　　(4) 2.329

18. The voltage safety factor (V_f) of a thyristor is given by :

(1) $V_f = \dfrac{V_{PIV}}{\sqrt{2} \cdot \text{R.M.S. value of the operating voltage}}$

(2) $V_f = \dfrac{V_{PIV}}{\sqrt{2} \cdot \text{R.M.S. value of the operating voltage}}$

(3) $V_f = \dfrac{V_{PIV}}{\sqrt{2} \cdot \text{Maximum value of the operating voltage}}$

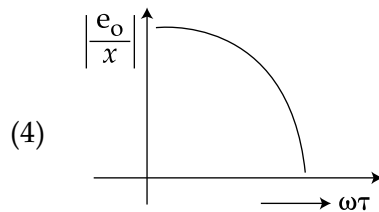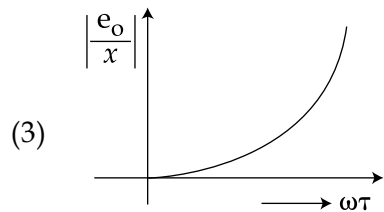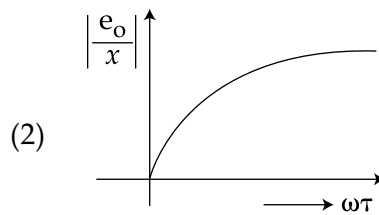(4) $V_f = \dfrac{V_{PIV}}{\sqrt{2} \cdot \text{Average of the operating voltage}}$
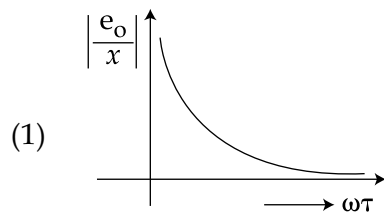
19. Which of the following is used to estimate the probable error of any measurement ?

(1) Uniform distribution
(2) Exponential distribution
(3) Parabolic distribution
(4) Gaussian distribution

20. The circuit diagram of a capacitive transducer is shown in the following figure :
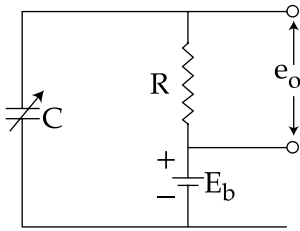
The frequency response of the transducer is :

21. Which of the following statements are **valid** for JFET ?

(a) $I_{DS} = I_{DSS}\left(1 - \dfrac{V_{GS}}{V_P}\right)$

(b) $I_{DS} = I_{DSS}\left(1 + \dfrac{V_{GS}}{V_P}\right)$

(c) $\mu = \dfrac{g_m}{r_d}$

(d) $\mu = g_m \cdot r_d$

Options :
(1) (a) and (c) are true
(2) (a) and (d) are true
(3) (b) and (c) are true
(4) (b) and (d) are true

22. Which of the following statements are **true** for a zener diode ?
(a) The voltage across the zener resistance is zero.
(b) The diode is used as a constant voltage device.
(c) The diode is used as a varactor diode.
(d) The diode is formed of heavily doped p and p - type semiconductor.
Options :
(1) (a), (b) and (d) are correct
(2) (b) and (d) are correct
(3) (b), (c) and (d) are correct
(4) (c), (a) and (d) are correct

23. h parameters can be obtained in terms of Z and Y parameters. Following statements have been given :

$$\left[\begin{array}{l} \text{Where } \Delta Z = Z_{11}\,Z_{22} - Z_{12}\cdot Z_{21} \\ \qquad \Delta Y = Y_{11}Y_{22} - Y_{12}\cdot Y_{21} \end{array}\right]$$

(a) $[h] = \begin{bmatrix} \dfrac{\Delta Z}{Z_{22}} & \dfrac{Z_{12}}{Z_{22}} \\ \dfrac{-Z_{21}}{Z_{22}} & \dfrac{1}{Z_{22}} \end{bmatrix}$

(b) $[h] = \begin{bmatrix} \dfrac{1}{Y_{22}} & \dfrac{-Y_{12}}{Y_{11}} \\ \dfrac{Y_{21}}{Y_{11}} & \dfrac{\Delta Y}{Y_{21}} \end{bmatrix}$

(c) $[h] = \begin{bmatrix} \dfrac{\Delta Z}{Z_{11}} & \dfrac{Z_{21}}{Z_{22}} \\ \dfrac{-Z_{21}}{Z_{22}} & \dfrac{1}{Z_{22}} \end{bmatrix}$

(d) $[h] = \begin{bmatrix} \dfrac{1}{Y_{11}} & \dfrac{-Y_{12}}{Y_{11}} \\ \dfrac{Y_{21}}{Y_{11}} & \dfrac{\Delta Y}{Y_{11}} \end{bmatrix}$

Out of the statements given above, which are **correct** ?
(1) (a) and (d) are correct
(2) (b) and (c) are correct
(3) (c) and (d) are correct
(4) (a) and (b) are correct

24. For the following signal :

$$x(n) = \left(\frac{1}{2}\right)^n u(n) + \left(\frac{1}{3}\right)^n u(n)$$

Z transforms and ROC has been given in below statements :

(a) $Z[x(n)] = \dfrac{Z}{Z - \frac{1}{2}} + \dfrac{Z}{Z - \frac{1}{3}}$

(b) ROC : $|Z| > \dfrac{1}{2}$ and $|Z| > \dfrac{1}{3}$

(c) $Z[x(n)] = \dfrac{Z}{Z + \frac{1}{2}} + \dfrac{Z}{Z + \frac{1}{3}}$

(d) ROC : $|Z| < \dfrac{1}{3}$ and $|Z| < \dfrac{1}{3}$

Out of the above given statements which are **correct** ?
(1) (b) and (c) are correct
(2) (a) and (b) are correct
(3) (c) and (d) are correct
(4) (a) and (d) are correct

25. Which of the following statements are **valid** for an oscillator ?
(a) It requires no dc supply.
(b) A phase shift around the feedback loop is zero.
(c) A gain of 1 around the feedback loop.
(d) A gain around the feedback loop of less than 1.
Options :
(1) (a) and (b) are correct
(2) (b) and (d) are correct
(3) (b) and (c) are correct
(4) (a), (b) and (c) are correct

26. For a full - wave rectifier, which of the following statements are **correct** ?

(a) $V_{dc} = \dfrac{2V_p}{\pi}$

(b) $f_{out} = 2f_{in}$

(c) $V_{dc} = \dfrac{2\pi}{V_p}$

(d) $I_{dc} = \dfrac{I_m}{\sqrt{\pi}}$

Options :
(1) (a), (b) and (c) are correct
(2) (a), (b) and (d) are correct
(3) (a) and (d) are correct
(4) (b) and (d) are correct

27. Flip Flop can be used to make :

(a) Latches

(b) Bounce - elimination switches

(c) ADDER

(d) Encoder

Which of the statements given above are **correct** ?

(1) (a) and (b) only   (2) (b) and (c) only

(3) (c) and (d) only   (4) (a) and (d) only

28. Shift Register can be used as :

(a) Delay line   (b) Ring counter   (c) Multiplier   (d) ADDER

Which of the statements given above are **correct** ?

(1) (a), (b) and (c) are correct   (2) (a) and (b) are correct

(3) (b), (c) and (d) are correct   (4) (c) and (d) are correct

29. The instructions that clear the accumulator in 8085 :

(a) MVI A, 00H   (b) ANI 00H   (c) RLC   (d) XRA A

Options :

(1) (a) and (c)   (2) (a), (b) and (d)   (3) (b) and (c)   (4) (b), (c) and (d)

30. Which of the following are 16 bit components ?

(a) Program Counter in 8085   (b) Number of Pins in 8251 USART

(c) Data Pins in 8088   (d) Data Pins in 8086

Options :

(1) (a) and (d)   (2) (b) and (c)   (3) (a) and (c)   (4) (a) and (b)

31. Consider the declaration.

static char hello [ ] = "hello";

The output of printf ("%s\n", hello); will be same as that of :

(a) puts("hello");   (b) puts(hello);

(c) printf("%s\n", "hello");   (d) puts("hello\n");

Options :

(1) (a), (b) and (c)   (2) (a), (b) and (d)

(3) (b), (c) and (d)   (4) (a), (c) and (d)

32. Let X be an array. Which of the following operations are illegal ?

(a) $++X$ (b) $X+1$ (c) $X++$ (d) $X*2$

Options :

(1) (a), (b) and (c)   (2) (b), (c) and (d)

(3) (a), (c) and (d)   (4) (a), (b) and (d)

33. For obtaining the VSWR, following statements have been given :

(a) If VSWR $= \infty$, there is perfect mismatch.

(b) If reflection coefficient $= 0$, there is perfect mismatch.

(c) The distance between successive maxima and minima $= \lambda/4$.

(d) The distance between successive maxima and minima $= \lambda/2$.

Out of the above statements which are **correct** ?

(1) (a), (b) and (d)   (2) (a) and (c)

(3) (b) and (d)   (4) (a), (b) and (c)

34. In dominant mode in a rectangular wave guide, following statements are given :

(a) There is no attenuation.

(b) There is no TEM mode propagation.

(c) There is no magnetic field component.

(d) The dominant modes shows the highest cut - off wavelength.

Out of the above statements which are **correct** ?

(1) (a) and (b)   (2) (b) and (d)

(3) (b) and (c)   (4) (a) and (d)

35. Read the following statements.

(a) Industrial noise is usually of impulse type.

(b) HF mixers are generally noisier than HF amplifiers.

(c) Thermal noise is independent of frequency at which it is measured.

(d) Impulse noise voltage is independent of the bandwidth.

Which of the above statements are **correct** ?

(1) (a) and (b) only   (2) (a), (b) and (c) only

(3) (b), (c) and (d) only   (4) (b) and (d) only

36. Read the following statements regarding the advantages of SSB over DSB and full carrier AM :

(a) In SSB more channel space is available.

(b) The transmitting circuit of SSB is more stable.

(c) The SSB signal is more noise - resistant.

(d) SSB needs less power for the same signal strength.

Which of the above statements are **correct** ?

(1) (a) and (b) only   (2) (b) and (c) only

(3) (a), (b) and (c) only   (4) (a), (c) and (d) only

37. In SCR, the following statements are given :

(a) It acts as a short circuit device.

(b) It acts as a open circuit device.

(c) ON state voltage is approximately 2 - 5 Volts.

(d) ON state voltage is approximately 50 - 100 Volts.

Which of the above statements are **correct** ?

(1) (a) and (d)   (2) (a) and (c)   (3) (b) and (d)   (4) (b) and (c)

38. Photodiode can be used as :

(a) as a detector in forward biased   (b) as a detector in reverse biased

(c) as an LDR   (d) it generates solar energy

Which of the above statements are **correct** ?

(1) (a) and (b)   (2) (b) and (c)   (3) (c) and (d)   (4) (a), (b) and (c)

39. Read the following statements :

(a) Stability is a performance measure of a system.

(b) A system is stable if all the poles of the transfer function have positive real part.

(c) A system is stable if all the zeros of the transfer function have negative real parts.

(d) A system is stable if all the poles of the transfer function have negative real parts.

Which of the above statement/s is/are **correct** ?

(1) Only (a)   (2) Only (a) and (c)

(3) Only (a) and (b)   (4) Only (a) and (d)

40. Read the following statements about the transfer function of a system :

(a) The transfer function provides complete insight into the structure of the system.

(b) It offers a symbolic picture about the dynamic characteristics of the system.

(c) It does not give any insight into the structure of the system.

(d) If the transfer functions of individual components of the system are known, the overall characteristics of the system can be determined just by taking their product.

Which of the above statements are **correct** ?

(1) Only (a) and (b)   (2) Only (b) and (c)

(3) Only (b) and (d)   (4) Only (b), (c) and (d)

41. Match the following :

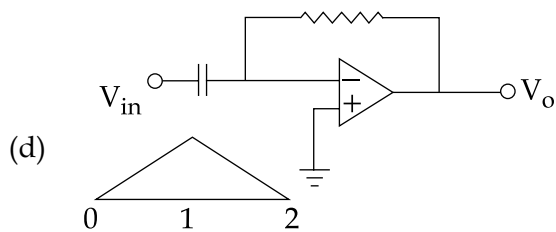|	**List - I**		**List - II**
(a)	Lift - off	(i)	Ficli's Equation
(b)	Dry Etching	(ii)	PMMA (Poly Methyl Methacrylate)
(c)	Lithography	(iii)	Bombardment of Plasma
(d)	Diffusion	(iv)	Structures of Target Material on the Surface of Substrate

Codes :

	(a)	(b)	(c)	(d)
(1)	(iv)	(iii)	(ii)	(i)
(2)	(iv)	(ii)	(iii)	(i)
(3)	(iii)	(i)	(ii)	(iv)
(4)	(i)	(iii)	(ii)	(iv)

42. Match the following in the context of RLC series circuit :

	List - I		**List - II**
(a)	Under damped	(i)	$\xi = 1$
(b)	Critically damped	(ii)	$\xi > 1$
(c)	Quality factor	(iii)	$\dfrac{1}{2\xi}$
(d)	Over damped	(iv)	$\xi < 1$

Codes :

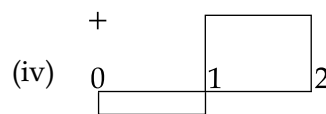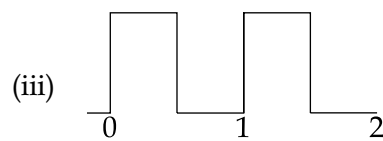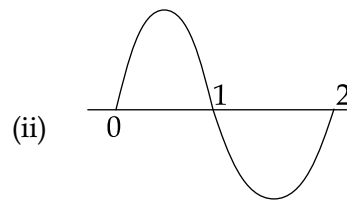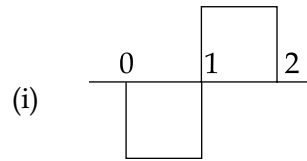|	(a)	(b)	(c)	(d)
(1)	(i)	(ii)	(iv)	(iii)
(2)	(iii)	(i)	(ii)	(iv)
(3)	(iv)	(i)	(iii)	(ii)
(4)	(ii)	(iii)	(i)	(iv)

43. Match the following :

List - I | | List - II

(a)

(i)

(b)

(ii)

(c)

(iii)

(d)

(iv)
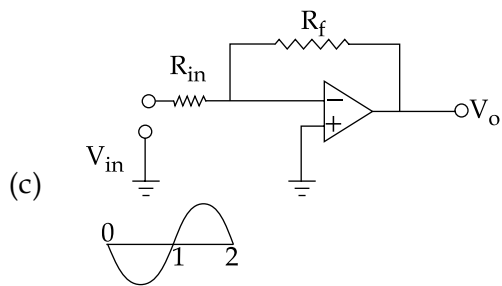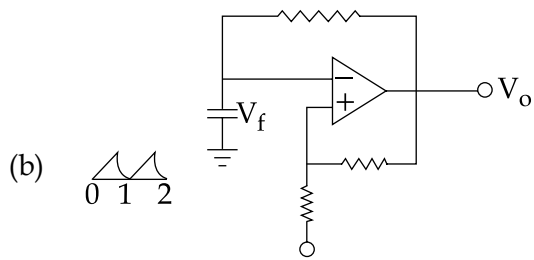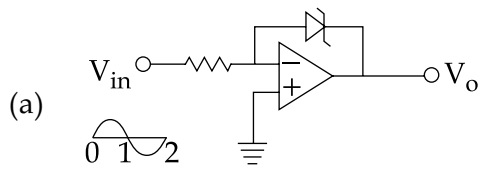
Codes :

	(a)	(b)	(c)	(d)
(1)	(iv)	(iii)	(ii)	(i)
(2)	(i)	(iv)	(iii)	(ii)
(3)	(i)	(ii)	(iii)	(iv)
(4)	(iv)	(i)	(iii)	(ii)

44. Match the following :

	List - I		List - II
(a)	Minimization	(i)	Multiplexer
(b)	Successive Approximation	(ii)	Shift Register
(c)	Data Selector	(iii)	A/D Convertor
(d)	Sequence Generator	(iv)	QM Method

Codes :

	(a)	(b)	(c)	(d)
(1)	(iii)	(i)	(ii)	(iv)
(2)	(iv)	(iii)	(i)	(ii)
(3)	(i)	(ii)	(iii)	(iv)
(4)	(ii)	(i)	(iv)	(iii)

45. Match the following in the context of 8085 μP :

	List - I		List - II
(a)	GND	(i)	Pin 26
(b)	RESET	(ii)	Pin 5
(c)	$\overline{RD}$	(iii)	Pin 35
(d)	VCC	(iv)	Pin 7

Codes :

	(a)	(b)	(c)	(d)
(1)	(i)	(iii)	(ii)	(iv)
(2)	(iv)	(i)	(iii)	(ii)
(3)	(iv)	(ii)	(i)	(iii)
(4)	(iv)	(iii)	(ii)	(i)

46. Match the following :

	List - I		**List - II**
(a)	Ternary operator	(i)	Subscript
(b)	Array	(ii)	Heterogeneous
(c)	Continue	(iii)	Three arguments
(d)	Structure	(iv)	Unconditional branch

Codes :

	(a)	**(b)**	**(c)**	**(d)**
(1)	(iv)	(iii)	(i)	(ii)
(2)	(iii)	(i)	(ii)	(iv)
(3)	(i)	(iii)	(iv)	(ii)
(4)	(iii)	(i)	(iv)	(ii)

47. Match the following :

List - I

(a) Return Loss

(b) Insertion Loss

(c) Transmission Loss

(d) Reflection Loss

List - II

(i) $10 \log \left(\dfrac{P_i}{P_i - P_r} \right)$

(ii) $10 \log \left(\dfrac{P_i - P_r}{P_o} \right)$

(iii) $10 \log \dfrac{P_i}{P_r}$

(iv) $10 \log_{10} \dfrac{P_i}{P_o}$

where $P_i \rightarrow$ input power at port - 1

$P_r \rightarrow$ reflected power at port - 1

$P_o \rightarrow$ output power at port - 2

Codes :

	(a)	**(b)**	**(c)**	**(d)**
(1)	(i)	(ii)	(iv)	(iii)
(2)	(iv)	(iii)	(ii)	(i)
(3)	(ii)	(i)	(iv)	(iii)
(4)	(iii)	(iv)	(i)	(ii)

48. Match the following :

List - I

(a)   Coherent PSK

(b)   Coherent FSK

(c)   Non - coherent DPSK

(d)   Non - coherent FSK

List - II

(i) $\frac{1}{2}\exp\left(-\frac{E_b}{2N_o}\right)$

(ii) $\frac{1}{2}\exp\left(-\frac{E_b}{N_o}\right)$

(iii) $\frac{1}{2}\mathrm{erfc}\left(\sqrt{E_b/N_o}\right)$

(iv) $\frac{1}{2}\mathrm{erfc}\left(\sqrt{E_b/2N_o}\right)$

Codes :

	(a)	(b)	(c)	(d)
(1)	(ii)	(iv)	(i)	(iii)
(2)	(i)	(ii)	(iii)	(iv)
(3)	(iii)	(iv)	(i)	(ii)
(4)	(iii)	(iv)	(ii)	(i)

49. Match the following :

List - I

(a)   UJT

(b)   SCR

(c)   DIAC

(d)   Mc-Murray

List - II

(i)   Latching current

(ii)   Bi-directional

(iii)   Inverter

(iv)   intrinsic stand off ratio

Codes :

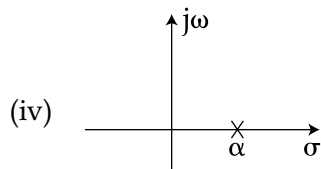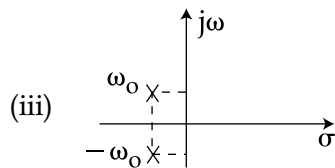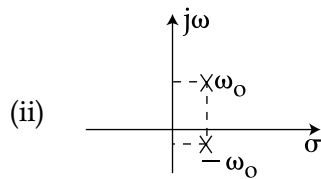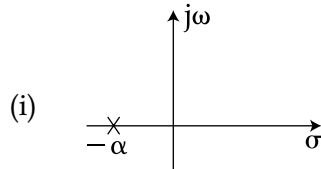|	(a)	(b)	(c)	(d)
(1)	(ii)	(i)	(iv)	(iii)
(2)	(iii)	(i)	(ii)	(iv)
(3)	(iv)	(i)	(ii)	(iii)
(4)	(i)	(ii)	(iv)	(iii)

50. Match the following :

List - I

(a) $\dfrac{1}{s - \alpha}$

(b) $\dfrac{1}{s + \alpha}$

(c) $\dfrac{1}{(s-\alpha)^2 + \omega_0^2}$

(d) $\dfrac{1}{(s+\alpha)^2 + \omega_0^2}$

List - II

(i)

(ii)

(iii)

(iv)

Codes :

	(a)	(b)	(c)	(d)
(1)	(iii)	(iv)	(i)	(ii)
(2)	(iii)	(ii)	(iv)	(i)
(3)	(iv)	(i)	(iii)	(ii)
(4)	(iv)	(i)	(ii)	(iii)

51. Arrange the below mentioned diodes in order of the increasing doping concentration level :

(a) Avalanche Diode   (b) Normal Diode

(c) Tunnel Diode   (d) Zener Diode

Options :

(1) (b), (a), (d), (c)   (2) (b), (d), (c), (a)

(3) (b), (d), (a), (c)   (4) (a), (b), (d), (c)

52. A 20 Ω resistor is connected in series with an inductor, a capacitor and an ammeter across a 25 Volts variable frequency supply. When the frequency is 400 Hz, the current attains its maximum value of 0.5A, and the potential difference across the capacitor is 150 V.

The values are given :

(a) Capacitance = 1.325 μF   (b) Inductance = 0.119 H

(c) Capacitance = 0.325 μF   (d) Inductance = 2 H

Which of the above values are **correct** ?

(1) (a) and (b)   (2) (b) and (c)

(3) (c) and (d)   (4) (a) and (d)

53. Arrange the below referred amplifiers in the decreasing order of the input impedance :

(a) Common Base Transistor Amplifier

(b) Common Emitter Transistor Amplifier

(c) Common Collector Transistor Amplifier

(d) Operation Amplifiers

Options :

(1) (a), (b), (c), (d)   (2) (c), (a), (b), (d)

(3) (d), (c), (b), (a)   (4) (d), (b), (c), (a)

54. For a logic family, if :

V_{OH} is minimum output high level voltage.

V_{OL} is maximum output low level voltage.

V_{IH} is minimum acceptable input high level voltage.

V_{IL} is maximum acceptable input low level voltage.

The **correct** relationship among these is :

(1) $V_{IH} > V_{OH} > V_{IL} > V_{OL}$ (2) $V_{OH} > V_{IH} > V_{IL} > V_{OL}$

(3) $V_{IH} > V_{OH} > V_{OL} > V_{IL}$ (4) $V_{OH} > V_{IH} > V_{OL} > V_{IL}$

55. In the 8257 DMA controller, the content of bits A_{15} (RD) $= 0$ and A_{14} (WR) $= 1$ of the terminal count register indicate :

(a) Write cycle in memory mapped.   (b) Read cycle in memory mapped.

(c) Write cycle in I/O mapped.   (d) Read cycle in I/O mapped.

Which of the above are **correct** ?

(1) (a) and (d)   (2) (a) and (b)

(3) (b) and (c)   (4) (c) and (d)

56. Following are the arithmetic operators in C :

(a) % (Modulus)   (b) − (Unary minus)

(c) + + (Increment)   (d) + (Binary plus)

Which one of the following sequence is **correct** in the order of decreasing priority of the above given operators ?

(1) (a), (c), (d), (b)   (2) (d), (b), (c), (a)

(3) (b), (c), (a), (d)   (4) (c), (b), (d), (a)

57. Following are the microwave bands given :

(a) C band   (b) L band

(c) Ku band   (d) Sub millimeter band

Arrange the above in the **ascending** order of frequencies. The **correct** sequence is :

(1) (b), (a), (d), (c)   (2) (d), (c), (a), (b)

(3) (d), (a), (c), (b)   (4) (b), (a), (c), (d)

58. Consider the following probability density function for a random variable x.

(a) $f_1(x) = 1$; $-1 \leq x \leq 1$

(b) $f_2(x) = x$; $0 \leq x \leq 1$

(c) $f_3(x) = (1 - x)$; $-1 \leq x \leq 1$

Arrange the above functions in terms of the increasing value of mean of random variable x.

(1) (a), (b), (c)   (2) (b), (a), (c)

(3) (c), (b), (a)   (4) (b), (c), (a)

59. Following semiconductor materials are given :

(a) Si   (b) Ge   (c) Ga P   (d) Ga As

Arrange them in ascending order of their band gap. The **correct** option is :

(1) (b), (a), (d), (c)   (2) (b), (a), (c), (d)

(3) (a), (b), (c), (d)   (4) (d), (a), (b), (c)

60. Consider the following circuit :

(a)

(b)

(c)
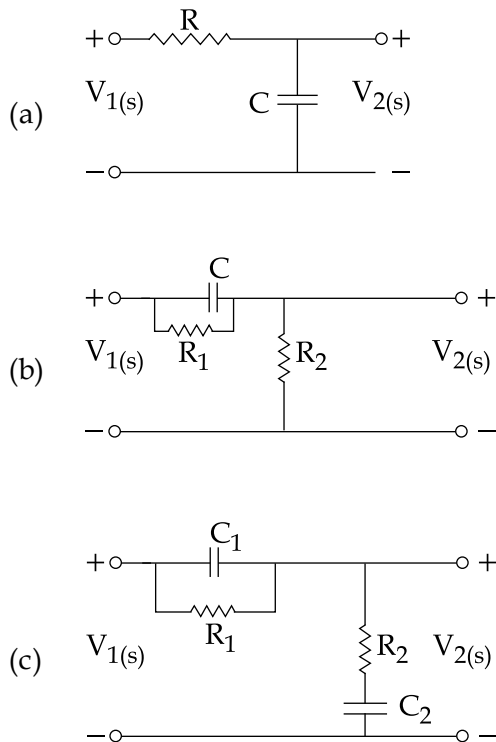
Arrange the above circuits in terms of decreasing number of total number of poles and zeros.

(1) (a), (b), (c) (2) (a), (c), (b) (3) (b), (a), (c) (4) (c), (b), (a)

Directions for questions 61 to 70 : The following items consist of two statements, one labelled the "**Assertion (A)**" and the other labelled "**Reason (R)**". You are to examine the two statements carefully and decide if the Assertion **(A)** and 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 :

(1) Both **(A)** and **(R)** are true and **(R)** is the correct explanation of **(A)**.

(2) Both **(A)** and **(R)** are true, but **(R)** is not the correct explanation of **(A)**.

(3) **(A)** is true, but **(R)** is false.

(4) **(A)** is false, but **(R)** is true.

61. Assertion (A) : When a Varactor Diode is connected to an inductor L in a resonant circuit, the resonant frequency varies linearly with voltage applied to the varactor.

   Reason (R) : Because the PN junction used is an hyperabrupt PN junction.

62. Assertion (A) : Laplace and Z transforms can be applied to the analysis of many unstable systems and consequently play an important role in the investigation of the stability or instability of the systems.

   Reason (R) : The region of convergence of the Laplace transform of x(t) is given by the

   expression : $\int\limits_{-\infty}^{\infty} x(t)e^{-\sigma t}\,dt \geq \infty$

63. Assertion (A) : A small signal amplifier is one where the input voltage is sufficiently small and change in output current is only small fraction of the mean output current.

   Reason (R) : Several stages of small signal amplifiers are therefore coupled together in cascade.

64.
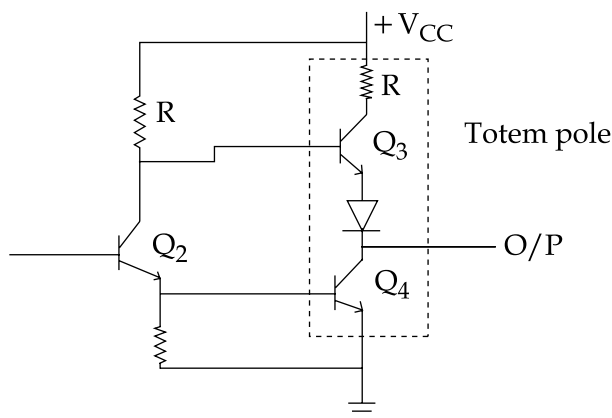
   Assertion (A) : In the Fig. above, output in HIGH state, Q3 acts as an emitter follower with its associated low output impedance. This low output impedance provides a small time constant for charging up any capacitive load as the output. This action is called active pull-up and it provides very fast rise time wave forms at TTL Totem - pole output.

   Reason (R) : Totem - pole outputs cannot be wire ANDed i.e. outputs of a number of gates cannot be tied together to obtain AND operation of those outputs.

65. **Assertion (A) :** The data bus of a microprocessor is used to transfer information between the µp and memory, between the µp and I/O device.

    Reason (R) : The data bus of a microprocessor is unidirectional.

66. **Assertion (A) :** Unless we call initgraph( ), we cannot draw anything on the screen.

    Reason (R) : Any shape drawn on the screen can be animated using the getimage( ) and putimage( ) functions.

67. **Assertion (A) :** Circular polarisation is a special case of elliptical polarisation.

    Reason (R) : In elliptical polarisation, the wave has two components, one is traversing in x direction and other traverses in y direction. Which causes the Electric Vector to rotate as a function of time.

68. **Assertion (A) :** As compared to PWM, PAM and PPM, PCM is much better for noise immunity.

    Reason (R) : PCM depends only on the presence or absence of pulses at any given time, not on any characteristics of the pulses which could be distorted.

69. **Assertion (A) :** Light is electromagnetic wave in nature, these may be x - rays, radio waves, microwaves etc.

    Reason (R) : The amount of energy depends on the intensity of the light rays. The energy associated with each photon is proportional to the frequency.

70. **Assertion (A) :** The dynamics of a system can be represented by a series of first order differential equations.

    Reason (R) : The state variables describe the future response of a system, given the present state, the excitation inputs, and the equations describing the dynamics.

Directions for question numbers 71 to 75 : Read the passage and answer the questions from 71 to 75 that follow based on your understanding of passage :

A microprocessor is a semiconductor chip fabricated with entire central processing unit (CPU) on it. It is a programmable device that accepts binary data from an input device, processes the data according to the instructions stored in the memory and provides results as output. Basically microprocessor performs two functions - (a) Fetches an instruction from the memory and (b) Performs the operation specified by the instruction. There are special inputs to the microprocessor called interrupts. External devices use these interrupts to get the microprocessor attention. A micro computer can be built by using 8085 microprocessor along with many other chips such as 8155, 8255, 8279, 8253, 8257, 8259, 8251 etc. 8085 microprocessor is 8 - bit microprocessor which has 8 - bit data registers where as 8086 is a 16 - bit microprocessor.

71. In 8085, if the clock frequency is 5 MHz, the time required to execute an instruction of 18 T - states is :

    (1)   1.6 μ sec   (2)   3.6 μ sec   (3)   2.6 μ sec   (4)   4.6 μ sec

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

    (1)   The sign status flag

    (2)   The auxiliary carry status flag

    (3)   The carry status flag

    (4)   The zero status flag

73. PUSH B instruction in 8085 μp causes :

    (1)   The contents of register B only to be copied in the stack.

    (2)   The contents of registers B and C to be transferred in the stack and the registers get cleared.

    (3)   The contents of registers B and C to be copied in the stack.

    (4)   Registers B and C to be cleared.

74. The technique of assigning a memory address to each I/O device in the computer system is called :

    (1)   Isolated I/O   (2)   Ported I/O

    (3)   Dedicated I/O   (4)   Memory - Mapped I/O

75. Which instruction cannot force the 8086 processor to come out of 'HALT' state ?

    (1)   Interrupt request

    (2)   RESET

    (3)   Both interrupt request and RESET

    (4)   HOLD

- o 0 o -

Space For Rough Work