Test Paper : **III**

Test Subject : **ELECTRONIC SCIENCE**

Test Subject Code : **K-3117**

Test Booklet Serial No. : _____

OMR Sheet No. : _____

Roll No. | | | | | | | | |

(Figures as per admission card)

**Name & Signature of Invigilator/s**

Signature : _____

Name : _____

**Paper : III**

**Subject : ELECTRONIC SCIENCE**

Time : 2 Hours 30 Minutes | Maximum Marks : 150

Number of Pages in this Booklet : **16** | Number of Questions in this Booklet : **75**

### ಅಭ್ಯರ್ಥಿಗಳಿಗೆ ಸೂಚನೆಗಳು

1. ಈ ಪುಟದ ಮೇಲ್ತುದಿಯಲ್ಲಿ ಒದಗಿಸಿದ ಸ್ಥಳದಲ್ಲಿ ನಿಮ್ಮ ರೋಲ್ ನಂಬರನ್ನು ಬರೆಯಿರಿ.
2. ಈ ಪತ್ರಿಕೆಯು ಬಹು ಆಯ್ಕೆ ವಿಧದ ಎಪ್ಪತ್ತೈದು ಪ್ರಶ್ನೆಗಳನ್ನು ಒಳಗೊಂಡಿದೆ.
3. ಪರೀಕ್ಷೆಯ ಪ್ರಾರಂಭದಲ್ಲಿ, ಪ್ರಶ್ನೆಪುಸ್ತಿಕೆಯನ್ನು ನಿಮಗೆನೀಡಲಾಗುವುದು. ಮೊದಲ5 ನಿಮಿಷಗಳಲ್ಲಿ ನೀವು ಪುಸ್ತಿಕೆಯನ್ನು ತೆರೆಯಲು ಮತ್ತು ಕೆಳಗಿನಂತೆ ಕಡ್ಡಾಯವಾಗಿ ಪರೀಕ್ಷಿಸಲು ಕೋರಲಾಗಿದೆ.
   (i) ಪ್ರಶ್ನೆ ಪುಸ್ತಿಕೆಗೆ ಪ್ರವೇಶಾವಕಾಶ ಪಡೆಯಲು, ಈ ಹೊದಿಕೆ ಪುಟದ ಅಂಚಿನ ಮೇಲಿರುವ ಪೇಪರ್ ಸೀಲನ್ನು ಹರಿಯಿರಿ. ಸ್ಟಿಕ್ಕರ್ ಸೀಲ್ ಇಲ್ಲದ ಅಥವಾ ತೆರೆದ ಪುಸ್ತಿಕೆಯನ್ನು ಸ್ವೀಕರಿಸಬೇಡಿ.
   (ii) **ಪುಸ್ತಿಕೆಯಲ್ಲಿನ ಪ್ರಶ್ನೆಗಳ ಸಂಖ್ಯೆ ಮತ್ತು ಪುಟಗಳ ಸಂಖ್ಯೆಯನ್ನು ಮುಖಪುಟದ ಮೇಲೆ ಮುದ್ರಿಸಿದ ಮಾಹಿತಿಯೊಂದಿಗೆ ತಾಳೆ ನೋಡಿರಿ. ಪುಟಗಳು/ಪ್ರಶ್ನೆಗಳು ಕಾಣೆಯಾದ, ಅಥವಾ ದ್ವಿಪ್ರತಿ ಅಥವಾ ಅನುಕ್ರಮವಾಗಿಲ್ಲದ ಅಥವಾ ಇತರ ಯಾವುದೇ ವ್ಯತ್ಯಾಸದ ದೋಷಪೂರಿತ ಪುಸ್ತಿಕೆಯನ್ನು ಕೂಡಲೆ5 ನಿಮಿಷದ ಅವಧಿ ಒಳಗೆ, ಸಂವೀಕ್ಷಕರಿಂದ ಸರಿ ಇರುವ ಪುಸ್ತಿಕೆಗೆ ಬದಲಾಯಿಸಿಕೊಳ್ಳಬೇಕು. ಆ ಬಳಿಕ ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆಯನ್ನು ಬದಲಾಯಿಸಲಾಗುವುದಿಲ್ಲ, ಯಾವುದೇ ಹೆಚ್ಚು ಸಮಯವನ್ನೂ ಕೊಡಲಾಗುವುದಿಲ್ಲ.**
4. ಪ್ರತಿಯೊಂದು ಪ್ರಶ್ನೆಗೂ(A), (B), (C) ಮತ್ತು(D) ಎಂದು ಗುರುತಿಸಿದ ನಾಲ್ಕು ಪರ್ಯಾಯ ಉತ್ತರಗಳಿವೆ. ನೀವು ಪ್ರಶ್ನೆಯ ಎದುರು ಸರಿಯಾದ ಉತ್ತರದ ಮೇಲೆ, ಕೆಳಗೆ ಕಾಣಿಸಿದಂತೆ ಅಂಡಾಕೃತಿಯನ್ನು ಕಪ್ಪಾಗಿಸಬೇಕು.

   **ಉದಾಹರಣೆ:** (A) (B) ● (D)

   (C) ಸರಿಯಾದ ಉತ್ತರವಾಗಿದ್ದಾಗ.
5. ಪ್ರಶ್ನೆಗಳಿಗೆ ಉತ್ತರಗಳನ್ನು, **ಪತ್ರಿಕೆIII ಪುಸ್ತಿಕೆಯೊಳಗೆ ಕೊಟ್ಟಿರುವ**OMR **ಉತ್ತರ ಹಾಳೆಯಲ್ಲಿ ಮಾತ್ರವೇ ಸೂಚಿಸತಕ್ಕದ್ದು.** OMR ಹಾಳೆಯಲ್ಲಿನ ಅಂಡಾಕೃತಿ ಹೊರತುಪಡಿಸಿ ಬೇರೆ ಯಾವುದೇ ಸ್ಥಳದಲ್ಲಿ ಗುರುತಿಸಿದರೆ, ಅದರ ಮೌಲ್ಯಮಾಪನ ಮಾಡಲಾಗುವುದಿಲ್ಲ.
6. OMR ಉತ್ತರ ಹಾಳೆಯಲ್ಲಿ ಕೊಟ್ಟ ಸೂಚನೆಗಳನ್ನು ಜಾಗರೂಕತೆಯಿಂದ ಓದಿರಿ.
7. ಎಲ್ಲಾ ಕರಡು ಕೆಲಸವನ್ನು ಪುಸ್ತಿಕೆಯ ಕೊನೆಯಲ್ಲಿ ಮಾಡತಕ್ಕದ್ದು.
8. ನಿಮ್ಮ ಗುರುತನ್ನು ಬಹಿರಂಗಪಡಿಸಬಹುದಾದ ನಿಮ್ಮ ಹೆಸರು ಅಥವಾ ಯಾವುದೇ ಚಿಹ್ನೆಯನ್ನು, ಸಂಗತವಾದ ಸ್ಥಳ ಹೊರತು ಪಡಿಸಿ, OMR ಉತ್ತರ ಹಾಳೆಯ ಯಾವುದೇ ಭಾಗದಲ್ಲಿ ಬರೆದರೆ, ನೀವು ಅನರ್ಹತೆಗೆ ಬಾಧ್ಯರಾಗಿರುತ್ತೀರಿ.
9. ಪರೀಕ್ಷೆಯು ಮುಗಿದನಂತರ, ಕಡ್ಡಾಯವಾಗಿ OMR ಉತ್ತರ ಹಾಳೆಯನ್ನು ಸಂವೀಕ್ಷಕರಿಗೆ ನೀವು ಹಿಂತಿರುಗಿಸಬೇಕು ಮತ್ತು ಪರೀಕ್ಷಾ ಕೊಠಡಿಯ ಹೊರಗೆ OMR ನ್ನು ನಿಮ್ಮೊಂದಿಗೆ ಕೊಂಡೊಯ್ಯಕೂಡದು.
10. ಪರೀಕ್ಷೆಯ ನಂತರ, ಪರೀಕ್ಷಾ ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆಯನ್ನು ಮತ್ತು ನಕಲು OMR ಉತ್ತರ ಹಾಳೆಯನ್ನು ನಿಮ್ಮೊಂದಿಗೆ ತೆಗೆದುಕೊಂಡು ಹೋಗಬಹುದು.
11. **ನೀಲಿ/ಕಪ್ಪು ಬಾಲ್‌ಪಾಯಿಂಟ್ ಪೆನ್ ಮಾತ್ರವೇ ಉಪಯೋಗಿಸಿರಿ.**
12. **ಕ್ಯಾಲ್ಕುಲೇಟರ್, ವಿದ್ಯುನ್ಮಾನ ಉಪಕರಣ ಅಥವಾ ಲಾಗ್ ಟೇಬಲ್ ಇತ್ಯಾದಿಯ ಉಪಯೋಗವನ್ನು ನಿಷೇಧಿಸಲಾಗಿದೆ.**
13. **ಸರಿ ಅಲ್ಲದ ಉತ್ತರಗಳಿಗೆ ಋಣ ಅಂಕ ಇರುವುದಿಲ್ಲ.**
14. **ಕನ್ನಡ ಮತ್ತು ಇಂಗ್ಲೀಷ್ ಆವೃತ್ತಿಗಳ ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆಗಳಲ್ಲಿ ಯಾವುದೇ ರೀತಿಯ ವ್ಯತ್ಯಾಸಗಳು ಕಂಡುಬಂದಲ್ಲಿ, ಇಂಗ್ಲೀಷ್ ಆವೃತ್ತಿಗಳಲ್ಲಿರುವುದೇ ಅಂತಿಮವೆಂದು ಪರಿಗಣಿಸಬೇಕು.**

### 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 the cover page. Do not accept a booklet without sticker seal or 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.**
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** : (A) (B) ● (D)

   where (C) is the correct response.
5. Your responses to the question of Paper III are to be indicated in the **OMR Sheet kept inside the Booklet**. If you mark at any place other than in the circles in OMR Sheet, it will not be evaluated.
6. Read the instructions given in OMR carefully.
7. Rough Work is to be done in the end of this booklet.
8. If you write your name or put any mark on any part of the OMR Answer Sheet, except for the space allotted for the relevant entries, which may disclose your identity, you will render yourself liable to disqualification.
9. You have to return the test 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. You can take away question booklet and carbon copy of OMR Answer Sheet after the examination.
11. **Use only Blue/Black Ball point pen.**
12. **Use of any calculator, Electronic gadgets or log table etc., is prohibited.**
13. **There is no negative marks for incorrect answers.**
14. **In case of any discrepancy found in the Kannada translation of a question booklet the question in English version shall be taken as final.**

## ELECTRONIC SCIENCE

## PAPER – III

**Note :** This paper contains **seventy-five (75)** objective type questions. **Each** question carries **two (2)** marks. **All** questions are **compulsory**.

**1.** The ratio of peak current to valley current in tunnel diode constructed using Germanium is

(A) 3

(B) 8

(C) 15

(D) 20

**2.** How will a D-MOSFET input impedance changes with signal frequency ?

(A) As frequency increases input impedance increases

(B) As frequency increases input impedance is unaffected

(C) As frequency decreases input impedance increases

(D) As frequency decreases input impedance is unaffected

**3.** IC capacitors

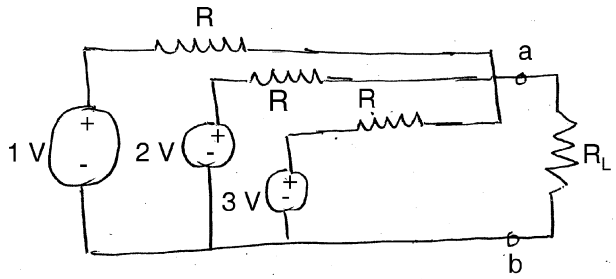
(A) Can be made with diffusion

(B) Can be made with silicon dioxide

(C) Can only be made with Ga As

(D) Cannot be made with p-n junctions

**4.** For the circuit shown in the following figure, it is given that the maximum power delivered to the load $R_L$ is 3 mW. The value of R is



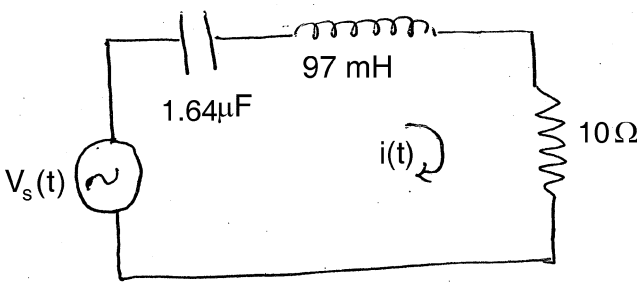

(A) 0.3 kΩ

(B) 0.8 kΩ

(C) 1 kΩ

(D) 2 kΩ

**5.** Find i(t) when $V_s(t) = 100 \sin (2510t)$ in the following figure shown.



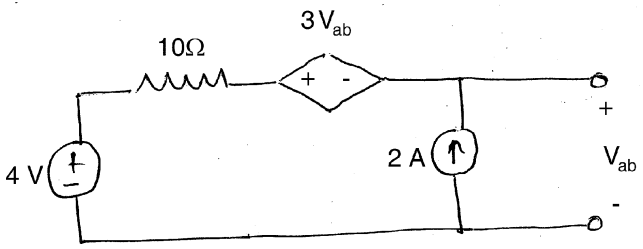

(A) 10 sin (2510 t)

(B) 10 cos (25 t)

(C) 10 sin (25 t)

(D) 10 cos (2510 t)

**6.** What is the voltage $V_{ab}$ in volts for the circuit shown in the following figure ?




(A) 1 V

(B) 6 V

(C) 18 V

(D) – 18 V

**7.** A dc power supply has no load voltage of 30 V and a full load voltage of 25 V at full load current of 1 A. Its output resistance and load regulation respectively are

(A) 5Ω and 20%

(B) 5Ω and 16.7%

(C) 25Ω and 16.7%

(D) 25Ω and 20%

**8.** A three stage amplifier with identical stages has an overall lower and upper 3 dB cut off frequencies of 10 Hz and 10 kHz respectively. What is the bandwidth of individual stages assuming that the stages are non-iterative stages ?

(A) 9990 Hz

(B) 2154 Hz

(C) 19605 Hz

(D) 19500 Hz

**9.** The bandwidth of the low pass filter in a PLL determines the

(A) Lock range

(B) Phase difference

(C) Capture range

(D) Free-running frequency

**10.** Two 4-bit binary numbers (1011 and 1111) are input to 4-bit parallel adder. The carry input is 1. What are the values for the sum and carry output ?

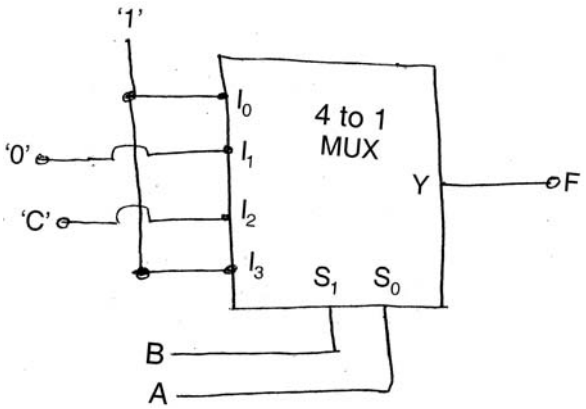
(A) $\sum_4 \sum_3 \sum_1 \sum_2 = 0111, C_{out} = 0$

(B) $\sum_4 \sum_3 \sum_2 \sum_1 = 1111, C_{out} = 1$

(C) $\sum_4 \sum_3 \sum_2 \sum_1 = 1100, C_{out} = 1$

(D) $\sum_4 \sum_3 \sum_2 \sum_1 = 1011, C_{out} = 1$

**11.** Identify the product of sums of a Boolean function represented by logic diagram shown in the following




(A) F(A, B, C) = π 1, 2, 5

(B) F(A, B, C) = ∑0, 3, 4, 6, 7

(C) F(A, B, C) = π 0, 3, 4, 6, 7

(D) F(A, B, C) = ∑1, 2, 5

**12.** Of the various commonly used logic families the one with highest speed and the one with least power dissipation, respectively.

(A) TTL and CMOS

(B) ECL and CMOS

(C) CMOS and TTL

(D) CMOS and ECL

**13.** Which of the following is not true w.r.t. instruction queue of 8086 ?

(A) Pipelining

(B) Execution unit

(C) Storing instructions

(D) Six bytes

**14.** The internal RAM of the 8051 is

(A) 32 bytes

(B) 64 bytes

(C) 128 bytes

(D) 256 bytes

**15.** Identify the instruction which does not belong to 8085/8086 instruction sets.

(A) MOV A, B

(B) XOR B

(C) AJMP

(D) SHR

**16.** In a C expression using assignment operators, relational operators and arithmetic operators, the hierarchy of operators (in the absence of parenthesis) is

(A) Assignment, relational, arithmetic

(B) Relational, assignment, arithmetic

(C) Arithmetic, assignment, relational

(D) Arithmetic, relational, assignment

**17.** The output of following C code is

```
# include < stdio.h>
Void main ( )
{
  int i = 2, j = 3;
  for (i = 0; i < 5; i++)
  for (j = 0; j < 4; j++)
  {
    if (i > 1)
    continue ;
    printf ("KSET ln");
  }
}
```

(A) KSET is printed 6 times

(B) KSET is printed 7 times

(C) KSET is printed 8 times

(D) KSET is printed 9 times

**18.** For initialisation a = 2, c = 1 the value of a and c after this code will be
C = (c) ? a = 0 : 2 ;

(A) a = 2, c = 2;

(B) a = 1, c = 2;

(C) a = 0, c = 2;

(D) a = 0, c = 0;

**19.** Magic Tee is a combination of

(A) Frequency meter and Isolator

(B) E-Plane Tee and H-Plane Tee

(C) E-Plane Tee and Matched Load

(D) Matched load and Directional Coupler

**20.** The cut of wavelength $\lambda_C$ for $TE_{20}$ mode for a standard rectangular Wave guide is

(A) 2/a

(B) 2a

(C) a

(D) $a^2$

**21.** Which of the following devices has the negative resistance characteristic ?

(A) Gunn diode

(B) PIN diode

(C) Reflex Klystron

(D) Magnetron

**22.** In modulation, carrier is

(A) Resultant wave

(B) Voltage for which frequency, phase or amplitude is varied

(C) Speech voltage to be transmitted

(D) Voltage with constant frequency, phase or amplitude

**23.** A zero mean white Gaussian noise is passed through an ideal low pass filter of bandwidth 10 kHz. The output of the samples so obtained would be

(A) Correlated

(B) Uncorrelated

(C) Orthogonal

(D) Statistically independent

**24.** A TDM link has 20 signal channels and each channel is sampled at 8000 samples per second. Each sample is represented by 7-bit binary and contains an additional bit for synchronisation. The total bit rate for the TDM link is

(A) 1180 Mbps

(B) 1180 Kbps

(C) 1280 Kbps

(D) 1280 Mbps

**25.** In a constant frequency operation of a Chopper circuit

(A) The width of the on-time pulse is kept constant and pulse amplitude is varied

(B) The width of both on-time and off-time pulse are varied

(C) The amplitude of both on-time and off-time pulses is varied

(D) The width of the on-time is varied and the pulse amplitude is kept constant

**26.** Which of the following characteristics is not associated with laser light ?

(A) Coherence

(B) Brightness

(C) Bire fringes

(D) Polarization

**27.** Fibre optic splices suffer highest loss due to

(A) Axial misalignment

(B) Air gaps

(C) Angular misalignment

(D) Longitudinal misalignment

**28.** The delta signal in an EEG indicates

(A) Awake state of brain

(B) Deep sleep of brain

(C) Hungry signal sent by brain

(D) Movements associated with muscles

**29.** In a PID controller, the overshoot has increased. The derivative time constant has to be _____ so as to reduce overshoots.

(A) Reduced to zero

(B) Reduced to a finite value

(C) Increased

(D) Constant

**30.** The second order system defined by $\frac{25}{(s^2 + 5s + 25)}$ is subjected to a step input. The time taken for the output to settle within 2% of the input is

(A) 2 seconds

(B) 0.4 seconds

(C) 1.28 seconds

(D) 1.65 seconds

**31.** Which of the following statement is valid

i. The resistance of the intrinsic semiconductor decreases with increase of temperature

ii. Doping pure Si with trivalent impurities gives p-type semiconductor

iii. The majority carriers in n-type semiconductor are holes

iv. A p-n junction can act as a semiconductor diode

(A) i, ii and iv

(B) i, iii and iv

(C) ii, iii and iv

(D) iii and iv

**32.** Following are the valid relations.

i. $h_{11} = h_i = \left.\frac{\partial V_1}{\partial I_1}\right|_{I_1 = \text{const.}}$

ii. $h_{12} = h_r = \left.\frac{\partial V_1}{\partial I_1}\right|_{V_2 = \text{const.}}$

iii. $h_{22} = h_o = \left.\frac{\partial I_2}{\partial V_2}\right|_{I_1 = \text{const.}}$

(A) i and iii

(B) ii and iii

(C) iii

(D) i and ii

**33.** Which of the following is/are correct w.r.t. centre tap full wave rectifier ?

i. Load current flows for both the half cycle

ii. Load current is pulsating DC

iii. PIV across the diode will be $V_{in}$

iv. $V_{dc} = V_m / 2\pi$

(A) i, ii and iii

(B) iii and iv

(C) ii and iv

(D) i and ii

**34.** Which of the following are true ?

i. Two switching functions are equivalent, if and only if their canonical SOP forms equivalent

ii. Two switching functions are equivalent, if both contains same number of literals

iii. Two switching functions are equivalent, if both give same output for all input combination

iv. Two switching functions are equivalent, if both having same prime implicants

(A) i, ii and iii

(B) ii, iii and iv

(C) i and ii

(D) i, iii and iv

**35.** With reference to a 2k bit ROM organised as 256×8 array of memory cells

i. It uses 256 rows of eight cells each

ii. It uses 2048 memory cells and 8-line to 256 line address decoder

iii. It uses 128 rows of seven cells each

iv. It uses 4096 memory cells and 7-line to 256 line address decoder

Which of the statement/s is/are correct ?

(A) ii and iv

(B) i and ii

(C) i and iv

(D) ii and iii

**36.** If we need to store word "INDIA" then which of the 'C' statement is/are correct ?

i. Char name [5] = "INDIA";

ii. Char name [ ] = "INDIA";

iii. Char name [6] = "INDIA";

iv. Char name [5] = {'I', 'N', 'D', 'I', 'A'};

(A) i, ii, iii and iv

(B) i and iv

(C) ii and iii

(D) ii, iii and iv

**37.** Which of the following is/are not the X-bands ?

i. 12 to 18 GHz

ii. 8.2 to 12 GHz

iii. 18 to 24 GHz

iv. 5.2 to 8.4 GHz

(A) i, iii and iv

(B) i, ii and iii

(C) iii, i and ii

(D) iv, i and ii

**38.** Auto correlation is a function

i. Which matches a signal with its delayed version

ii. Of time difference

iii. Maximum at origin

iv. Which results weak peak for white noise

(A) i, ii and iv

(B) ii, iii and iv

(C) iv

(D) i, ii and iii

**39.** Consider the following.

i. Monomode fiber

ii. High numerical aperture optical fiber

iii. Avalanche photodiode

iv. Low numerical operture optical fiber

Which of the above is/are correct reasons for high speed optical communication ?

(A) i, iii and iv

(B) i only

(C) i, ii and iii

(D) iii and iv

**40.** Consider the following.

i. Capacitive, LVDT, potentiometer

ii. Capacitive, thermistor, piezoelectric

iii. Thermistor, LVDT, photoelectric

iv. Potentiometer, piezoelectric, LVDT

Which of the above is/are valid statement/s ?

(A) i and iv

(B) ii, iii and iv

(C) iv only

(D) i only

Q. No. (s) : **41** to **50**

The following items consist of two statements, one labeled the "**Assertion (A)**" and other "**Reason (R)**". You are to examine these two statements carefully and decide if the **Assertion (A)** and the **Reason (R)** an 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 :

(A) Both (A) and (R) are true and (R) is 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

**41.** **Assertion (A)** : The intrinsic Fermi level of a semiconductor does not lie exactly at the middle of the energy band gap.

**Reason (R)** : The densities of the available states in valence band and conduction bands of an intrinsic semiconductor are same.

**42.** **Assertion (A)** : Impulse function is used to determine response of a given system

**Reason (R)** : Fourier transform of impulse function has infinite frequencies.

**43.** **Assertion (A)** : A Phased Lock Loop(PLL) can be used to double the frequency.

**Reason (R)** : PLL has a built in multiplier.

**44.** **Assertion (A)** : ECL gate structure inherently has high input impedance and low output impedance.

**Reason (R)** : ECL has large fan out and drive capability

**45.** **Assertion (A)** : Most of the 8085 registers are 8 bit

**Reason (R)** : 8085 is an 8 bit microprocessor

**46.** **Assertion (A)** : In "C" relational operators can not be used to evaluate whether a condition is true or false

**Reason (R)** : Use of '=' as relational operator will form a syntax error.

**47.** **Assertion (A)** : The copper loss is due to the resistance associated with the conductors constituting the transmission line

**Reason (R)** : The copper loss is independent of frequency

**48.** **Assertion (A)** : AM stereo broadcasting uses quadrature carrier multiplexing (QAM)

**Reason (R)** : QAM involves more stringent synchronization than an FDM system with SSB sub carrier modulation.

**49.** **Assertion (A)** : A half wave controlled rectifier has poorer efficiency and higher ripple factor than a full wave controlled rectifier.

**Reason (R)** : The use of a freewheeling diode in half wave controlled rectifier circuit improves the waveform of load current and circuit power factor.

**50.** **Assertion (A)** : A thermocouple transducer is based on seeback effect

**Reason (R)** : In a thermocouple transducer used for temperature measurement, the cold junction is usually kept in ice bath.

**51.** In case of transistor consider the following parameters.

I. $V_{BE\ (sat)}$

II. $V_{BE\ (cut\ in)}$

III. $V_{CE\ (sat)}$

IV. $V_{CE\ (cut\ off)}$

The correct sequence of the above referred parameters in decreasing order of the magnitude is

(A) IV, III, I, II

(B) III, I, II, IV

(C) I, IV, III, II

(D) IV, I, II, III

**52.** In case of Norton's theorem the correct steps of attaining the solution are :

I. Calculate Norton's resistance

II. Remove load resistor

III. Short all the voltage sources present in the network

IV. Calculate short current flowing between the terminals

(A) II, III, IV, I

(B) II, IV, III, I

(C) I, IV, III, II

(D) IV, III, II, I

**53.** Arrange the following oscillators in the order of increasing frequency range.

I. Wein bridge oscillator

II. Collector tuned oscillator

III. Hartley oscillator

(A) I, II, III

(B) III, II, I

(C) I, III, II

(D) III, I, II

**54.** Arrange the following ICs in the increasing order of modulo counter which can be obtained by using them

I. 7490

II. 7493

III. 7476

(A) I, III, II

(B) III, II, I

(C) I, II, III

(D) III, I, II

**55.** Consider the following steps/modules used during assembly language programming thereby facilitating conversion of *. asm file to Hex file :

I. Assembler

II. Editor

III. Linker/Locator

IV. Debugger

The correct sequence to get a bug free Hex file is

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

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

**56.** Arrange the following operators of 'C' language from highest to lowest priority

I. ~

II. >>

III. ? :

IV. &

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

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

**57.** For a circular waveguide arrange the cutoff wavelengths for the following modes in decreasing order

I. $TM_{01}$

II. $TE_{01}$

III. $TE_{11}$

IV. $TE_{21}$

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

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

**58.** Arrange the following memoryless sources in the increasing order of their entropy

I. $S_1 = \left\{\frac{1}{8}, \frac{1}{8}, \frac{1}{2}\right\}$

II. $S_2 = \left\{\frac{1}{4}, \frac{1}{4}, \frac{1}{2}\right\}$

III. $S_3 = \left\{\frac{1}{2}, \frac{1}{2}\right\}$

(A) II, I, III

(B) I, II, III

(C) III, II, I

(D) II, III, I

**59.** Arrange the misalignment in the optical fiber in the order of decreasing loss

I. Lateral misalignment

II. Longitudinal misalignment

III. Angular misalignment

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

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

**60.** Arrange the components in a double beam spectrophotometer in the order of their placement in the system

I. Grating

II. White light

III. Detector

IV. Beam splitter

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

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

**61.** Match **List – I** (Type of element) with **List – II** (Band structure)

| List – I | List – II |
|---|---|
| a. Copper | 1. Produces discrete energy level just below conduction band |
| b. Rubber | 2. Large forbidden gap |
| c. Antimony | 3. Valance and conduction band overlap |
| d. Boron | 4. Produces discrete energy level just above valance band |

**Codes :**

| | a | b | c | d |
|---|---|---|---|---|
| (A) | 3 | 2 | 4 | 1 |
| (B) | 4 | 1 | 2 | 3 |
| (C) | 1 | 3 | 2 | 4 |
| (D) | 4 | 2 | 1 | 3 |

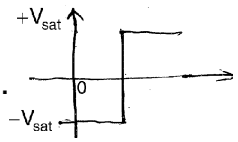
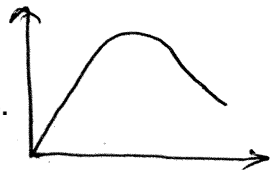
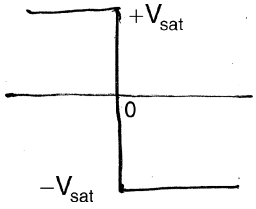
**62.** Match **List – I** (Terms) with **List – II** (Their essence)

| List – I | List – II |
|---|---|
| a. Branch | 1. A point in network where two or more elements join |
| b. Junction | 2. Equipotential surface at which two or more elements join |
| c. Node | 3. Space which encloses a loop |
| d. Mesh | 4. Any group of elements in series having two terminals |

**Codes :**

| | a | b | c | d |
|---|---|---|---|---|
| (A) | 4 | 1 | 2 | 3 |
| (B) | 1 | 2 | 4 | 3 |
| (C) | 2 | 1 | 3 | 4 |
| (D) | 4 | 3 | 2 | 1 |

**63.** Match **List – I** (Type of circuit) with **List – II** (Characteristics)

| List – I | List – II |
|---|---|
| a. Non-Inverting comparator | 1.  |
| b. Inverting zero crossing detector | 2.   |
| c. Step response of low pass filter | 3.  |
| d. Pulse response of low pass filter | 4.   |

**Codes :**

| | a | b | c | d |
|---|---|---|---|---|
| (A) | 2 | 1 | 4 | 3 |
| (B) | 2 | 4 | 1 | 3 |
| (C) | 1 | 3 | 2 | 4 |
| (D) | 4 | 2 | 1 | 3 |

**64.** Match **List – I** (Type of circuit) with **List – II** (Corresponding IC)

| List – I | List – II |
|---|---|
| a. Multiplexer | 1. 7490 |
| b. Demultiplexer | 2. 74614 |
| c. Schmitt trigger inverter | 3. 74151 |
| d. Decade counter | 4. 74155 |

**Codes :**

| | a | b | c | d |
|---|---|---|---|---|
| (A) | 3 | 1 | 2 | 4 |
| (B) | 1 | 2 | 3 | 4 |
| (C) | 3 | 4 | 2 | 1 |
| (D) | 4 | 3 | 2 | 1 |

**65.** Match **List – I** (Microprocessor/ Peripheral) with **List – II** (Intended function)

| List – I | List – II |
|---|---|
| a. 8085 | 1. Crystal oscillator |
| b. 8051 | 2. Timer |
| c. 8086 | 3. Segmentation |
| d. 8253 | 4. Monoshot |

**Codes :**

| | a | b | c | d |
|---|---|---|---|---|
| (A) | 1 | 2 | 3 | 4 |
| (B) | 2 | 3 | 1 | 4 |
| (C) | 4 | 3 | 1 | 2 |
| (D) | 2 | 1 | 4 | 3 |

**66.** Match **List – I** (Function) with **List – II** (Application)

| List – I | List – II |
|---|---|
| a. Calloc ( ) | 1. Frees previously allocated space |
| b. Free ( ) | 2. Modifies previously allocated space |
| c. Malloc ( ) | 3. Allocates space for array |
| d. Realloc ( ) | 4. Allocates requested size of space |

**Codes :**

| | a | b | c | d |
|---|---|---|---|---|
| (A) | 4 | 3 | 2 | 1 |
| (B) | 1 | 2 | 3 | 4 |
| (C) | 1 | 3 | 2 | 4 |
| (D) | 3 | 1 | 4 | 2 |

**67.** Match **List – I** (Circuit) with **List – II** (Application)

| List – I | List – II |
|---|---|
| a. Parallel wire | 1. Television |
| b. Coaxial cable | 2. Telephone |
| c. Rectangular waveguide | 3. Short distance high bandwidth |
| d. Dielectric waveguide | 4. Long distance high bandwidth |

**Codes :**

| | a | b | c | d |
|---|---|---|---|---|
| (A) | 1 | 2 | 3 | 4 |
| (B) | 2 | 1 | 3 | 4 |
| (C) | 4 | 3 | 2 | 1 |
| (D) | 1 | 2 | 4 | 3 |

**68.** Match **List – I** (Circuit type) with **List – II** (Intended application)

| List – I | List – II |
|---|---|
| a. Ring modulator | 1. F.M. demodulator |
| b. VCO | 2. Frequency conversion |
| c. Foster seeley discriminator | 3. Generation of DSB-SC |
| d. Mixer | 4. F.M. generation |

**Codes :**

| | a | b | c | d |
|---|---|---|---|---|
| (A) | 1 | 2 | 3 | 4 |
| (B) | 4 | 3 | 2 | 1 |
| (C) | 3 | 4 | 1 | 2 |
| (D) | 2 | 1 | 4 | 3 |

**69.** Match **List – I** (Different fibre generation) with **List – II** (Optical components used)

| List – I | List – II |
|---|---|
| a. First | 1. Graded index multimode fibre and 1310 nm LED |
| b. Second | 2. Graded index multimode fibre and 850 nm LED |
| c. Third | 3. Step index dispersion shifted monomode fibre and 1550 nm LED |
| d. Fourth | 4. Step index monomode fibre and 1310 nm LED |

**Codes :**

| | a | b | c | d |
|---|---|---|---|---|
| (A) | 1 | 2 | 3 | 4 |
| (B) | 2 | 1 | 3 | 4 |
| (C) | 1 | 2 | 4 | 3 |
| (D) | 2 | 1 | 4 | 3 |

**70.** Match **List – I** (Type of transducer) with **List – II** (Inherent property exhibited)

| List – I | List – II |
|---|---|
| a. Thermistor | 1. High voltage |
| b. Thermocouple | 2. A.C. voltage |
| c. Piezoelectric | 3. Hysterisis |
| d. LVDT | 4. Low voltage |

**Codes :**

| | a | b | c | d |
|---|---|---|---|---|
| (A) | 3 | 4 | 1 | 2 |
| (B) | 4 | 3 | 2 | 1 |
| (C) | 1 | 2 | 3 | 4 |
| (D) | 2 | 1 | 4 | 3 |

Read the following passage and answer the questions from **71** to **75**.

According to the Nyquist stability criterion, the closed loop system is stable if and only if

$N = -P_0 \leq 0$.

$P_0$ = Number of poles of GH(s) in the RHP.

N = Total number of clockwise encirclements of the point (–1, 0) in the GH(s) plane.

If $N > 0$, then the number of zeros of $(1 + GH)$ or poles of the closed-loop system in the RHP is given by $N + P_0$. Also, $N \leq 0$ implies that the point (–1, 0) is not enclosed by the Nyquist stability plot. N is determined by traversing the stability plot in the prescribed direction and

shading the region to the right of the contour. The Shaded region does not contain (–1, 0) point if N < 0.

**71.** One of the following expressions represent the Nyquist stability criterion. Here, N is number of clockwise encirclements of point ( –1, 0) and $P_0$ is the number of roots of 1 + GH in RHP

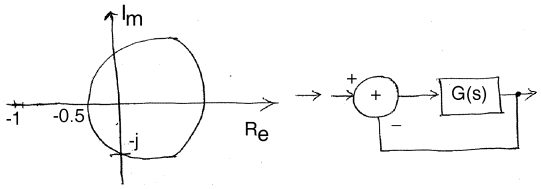
(A) $N + P_0 \leq 0$

(B) $N + P_0 \geq 0$

(C) $N + P_0 = 0$

(D) $N + P_0 < 0$

The Nyquist plot of a stable transfer function G(s) is shown in following figure. We are interested in the stability of the closed loop system in the feedback configuration shown




Answer questions **72** and **73** based on the above figure.

**72.** Which of the following statements are true ?

(A) G(s) is an all pass filter

(B) G(s) has a zero in the right-half plane

(C) G(s) is the impedance of a passive network

(D) G(s) is marginally stable

**73.** The gain and phase margins of G(s) for closed loop stability are

(A) 6 dB and 180°

(B) 3 dB and 180°

(C) 6 dB and 90°

(D) 3 dB and 90°

**74.** For Nyquist contour, the size of the radius is

(A) 25

(B) 0

(C) 1

(D) $\infty$

**75.** Consider a feedback system with gain margin of about 30. At what point does Nyquist plot crosses negative real axis ?

(A) –3

(B) –0.3

(C) –30

(D) –0.03

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