

Signature and Name of Invigilator

1. (Signature) _____

(Name) _____

2. (Signature) _____

(Name) _____

OMR Sheet No. :
(To be filled by the Candidate)Roll No.

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(In figures as per admission card)Roll No. _____
(In words)**N 0 8 8 1 7****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

- Write your roll number in the space provided on the top of this page.
- This paper consists of seventy five multiple-choice type of questions.
- 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 :
 - 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.
 - 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.
 - 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.
- 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.
- 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.
- Read instructions given inside carefully.
- Rough Work is to be done in the end of this booklet.
- 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.
- 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.
- Use only Blue/Black Ball point pen.
- Use of any calculator or log table etc., is prohibited.
- There are no negative marks for incorrect answers.

परीक्षार्थियों के लिए निर्देश

- इस पृष्ठ के ऊपर नियत स्थान पर अपना रोल नम्बर लिखिए।
- इस प्रश्न-पत्र में पचहत्तर बहुविकल्पीय प्रश्न हैं।
- 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 :
 - 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।
 - 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।
 - 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।
- 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।
- 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 चिह्नित करते हैं, तो उसका मूल्यांकन नहीं होगा।
- अन्दर दिये गये निर्देशों को ध्यानपूर्वक पढ़ें।
- कच्चा काम (Rough Work) इस पुस्तिका के अन्तिम पृष्ठ पर करें।
- 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।
- 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।
- केवल नीले/काले बाल प्वाइंट पेन का ही प्रयोग करें।
- किसी भी प्रकार का संगणक (कैलकुलेटर) या लाग टेबल आदि का प्रयोग वर्जित है।
- 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. In zone refining process if K is the distribution coefficient, C_S represents the concentration of dopant in solid phase and C_L represents the concentration of dopant in the liquid phase then K is defined as :

(1) $K = C_S / C_L$ (2) $K = C_L / C_S$ (3) $K = \frac{C_S}{C_L} + 1$ (4) $K = \frac{C_L}{C_S} - 1$

2. Barrier height in a metal-semiconductor contact can easily be estimated from :

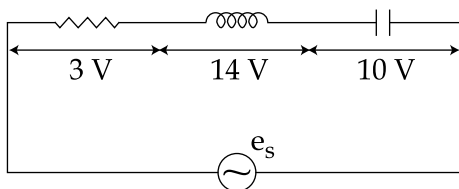
(1) $\left(\frac{1}{C}\right)$ versus V curve (2) $\left(\frac{1}{C^2}\right)$ versus V curve
(3) $\left(\frac{1}{C}\right)$ versus I curve (4) $\left(\frac{1}{C^2}\right)$ versus I curve

where C is capacitance, V is voltage and I is the current.

3. Two coils having equal resistances but different inductances (Say L_1 and L_2) having time constants τ_1 and τ_2 respectively, are connected in series. The time constant, ' τ ' of the series combination is :

(1) $\tau = \tau_1 + \tau_2$ (2) $\tau = \frac{\tau_1 + \tau_2}{2}$ (3) $\tau = \tau_1 / \tau_2$ (4) $\tau = \tau_1 \times \tau_2$

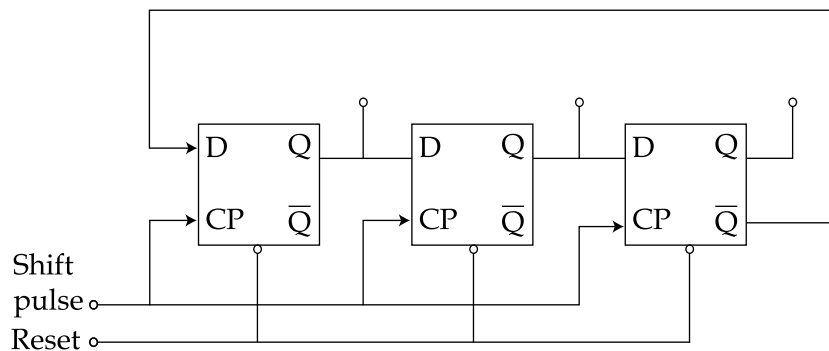
4. The rms voltage measured across each of the circuit elements in the figure given below is shown. When the circuit is excited using a sinusoidal source ' e_s ', the rms value of the source voltage ' e_s ' is :



(1) 1 V (2) 4 V (3) 5 V (4) 10 V



5. For a given JFET, the typical values of amplification factor and transconductance are given as 40 and $100 \mu\text{s}$ respectively. The dynamic drain resistance of JFET will be :
- (1) 200Ω (2) 400Ω (3) $200 \text{ k}\Omega$ (4) $400 \text{ k}\Omega$
6. For a given n-MOS capacitor with substrate doping of $N_A = 10^{17} \text{ cm}^{-3}$, oxide thickness 20 nm , $\epsilon_{\text{ox}} = 3.9 \epsilon_0$ the values of oxide capacitance and flat band capacitance are respectively given as (use $\epsilon_0 = 8.85 \times 10^{-14} \text{ F cm}^{-1}$) :
- (1) 142 nF/cm^2 and 172 nF/cm^2 (2) 172 nF/cm^2 and 142 nF/cm^2
 (3) 71 nF/cm^2 and 86 nF/cm^2 (4) 86 nF/cm^2 and 71 nF/cm^2
7. A three bit shift register is shown below to have content 000 again, the number of clock pulses required would be :



- (1) 2 (2) 3 (3) 6 (4) 7
8. If $(11X1Y)_8 = (12C9)_{16}$, then the respective values of X and Y are :
- (1) 1 and 5 (2) 3 and 1 (3) 5 and 7 (4) 7 and 5
9. The flag which indicates whether the interrupt that may occur at the interrupt pins of 8086 will actually be served or not is :
- (1) Direction flag (2) Interrupt enable flag
 (3) Trap flag (4) Overflow flag
10. The timer of 8155 consists of _____ counter and operates in _____.
- (1) 14 bit, 4 modes (2) 16 bit, 8 modes (3) 14 bit, 8 modes (4) 16 bit, 4 modes

11. Consider the following program of 'C'

```
main ( )  
  
{static int a[]={1,2,3,4,5,6,7,8};  
  
int i;  
  
for(i=2;i<6;++i)  
    a[a[i]]=a[i];  
  
for(i=0;i<8;++i)  
    printf ("%d",a[i]);  
  
}
```

The output of the program is :

- (1) 1 2 3 4 5 6 7 8 (2) 1 2 3 3 5 5 7 8
(3) 1 2 2 3 3 4 4 8 (4) None of the above

12. Assuming a 2-byte integer which of the following is the correct output for the program given below ?

```
# include <stdio.h>  
  
int main ()  
  
{  
  
printf ("%x\n",-1<<3);  
  
return 0;  
  
}
```

- (1) 0 0 0 0 (2) f f f f (3) f f f 8 (4) 0 0 0 8

13. A transmitting antenna of 100 m height radiates 40 kW at a frequency of 100 MHz uniformly in Azimuth plane. If the height of receiver antenna is 16 m, the value of Line of sight distance is given by :

- (1) 25 km (2) 57.68 km (3) 27.68 km (4) 114 km



14. The intrinsic impedance of a Lossy dielectric medium is given by :

(1) $\frac{j\omega\mu}{\sigma}$ (2) $\sqrt{\frac{j\omega\mu}{\sigma+j\omega\epsilon}}$ (3) $\frac{j\omega\epsilon}{\mu}$ (4) $\sqrt{\frac{\mu}{\epsilon}}$

15. The highest modulating signal frequency that can be demodulated by a peak detector without attenuation is given by.

(1) $f_m(\text{max}) = \frac{\sqrt{\left(\frac{1}{m^2}\right) - 1}}{2\pi RC}$ (2) $f_m(\text{max}) = \frac{\sqrt{m^2 - 1}}{2\pi RC}$

(3) $f_m(\text{max}) = \frac{\sqrt{1 - \frac{1}{m^2}}}{2\pi RC}$ (4) $f_m(\text{max}) = \frac{\sqrt{\left(\frac{1}{m^2}\right) + 1}}{2\pi RC}$

16. In digital companding, the analog signal is :

- (1) First converted to a linear PCM Code and then sampled.
- (2) First sampled and then converted to a linear PCM Code.
- (3) First sampled and then converted to a non - linear PCM Code.
- (4) Never sampled.

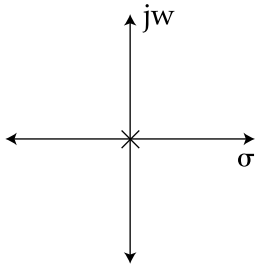
17. A Buck - converter is :

- (1) AC to DC converter (2) AC to AC converter
- (3) DC to DC converter (4) DC to AC converter

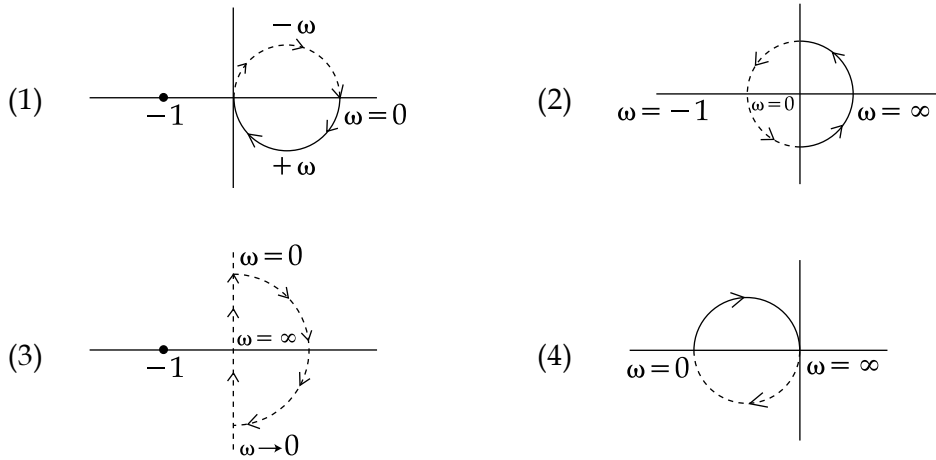
18. A certain Helium Neon Laser emitting at 633 nm has a line width of 0.002 nm. The coherence length of the laser is given by :

- (1) 40 cm (2) 5 cm (3) 20 cm (4) 10 cm

19. The root-locus of a typical transfer function is given as



The polar plot of the transfer function will be :



20. The characteristics polynomial of a control system is given as

$$q(s) = s^4 + s^3 + s^2 + s + k$$

The system is :

- | | |
|----------------------------------|--|
| (1) Stable for all values of k | (2) Stable for positive values of k |
| (3) Unstable for all values of k | (4) Unstable for only positive values of k |

21. Conductivity of a semiconductor depends upon :

- (a) doping density
- (b) mobility of charge carriers
- (c) Length of semiconductor
- (d) Shape of semiconductor

Code :

- | | |
|----------------------------------|----------------------------------|
| (1) (a), (b) and (c) are correct | (2) (b), (c) and (d) are correct |
| (3) (a) and (c) are correct | (4) (a) and (b) are correct |

22. A zener diode :
- (a) has sharp breakdown at low forward voltage
 - (b) has sharp breakdown at low reverse voltage
 - (c) can be used for voltage regulation
 - (d) has a negative resistance region

Code :

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

23. Consider the following statements associated with resonant frequency :

- (a) For a series RLC circuit, current is maximum
- (b) For a series RLC circuit, voltage across C is minimum
- (c) For a series RLC circuit, current is minimum
- (d) For a parallel RLC circuit, total impedance is maximum

Which one of the above statement are **correct** ?

- (1) (a), (b) and (d) only
- (2) (b) and (d) only
- (3) (a) and (d) only
- (4) (a) and (b) only

24. Consider the following statements for the hybrid parameters :

- (a) h_{11} is called input impedance with output shorted
- (b) h_{21} is current gain with output shorted
- (c) h_{12} is voltage feedback ratio with input terminals shorted
- (d) h_{22} is output admittance with input terminal open

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

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



25. The capacitance of a reverse biased PN junction :

- (a) increases as reverse bias is increased
- (b) increases as reverse bias is decreased
- (c) does not change by increasing or decreasing the reverse bias
- (d) can be used for varactor diode application

Code :

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

26. For making an Oscillator certain conditions are to be met in an amplifier :

- (a) - ve feedback
- (b) + ve feedback
- (c) Barkhausen criteria
- (d) Noise signal

Code :

- (1) (b), (d), (c) is correct
- (2) (a), (d), (c) is correct
- (3) (a), (c) is correct
- (4) (b), (a), (c) is correct

27. Which of the following statements regarding binary counters are correct ?

- (a) Clock inputs of all the flip - flops of a synchronous counter are applied from the same source whereas those in an asynchronous counters are from different sources.
- (b) Asynchronous counter has ripple effects whereas synchronous counter has not.
- (c) Only J-K flip-flops can be used in synchronous counters whereas asynchronous counters can be designed with any kind of flip flops.
- (d) Latches can be used for designing asynchronous counters.

Code :

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



28. Consider the following statements :

A multiplexer

- (a) Selects one of the several inputs and transmits it to a single output
- (b) Routes the data from a single input to many outputs
- (c) Converts parallel data into serial data
- (d) Is a combinational circuit

Which of these statements are **correct** ?

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

29. Which of the following statements on DRAM are correct ?

- (a) Page mode read operation is faster than RAS read.
- (b) RAS input remains active during column address strobe.
- (c) DRAM cell occupies more space than SRAM cell.
- (d) Static power is dissipated for storing charge in a capacitance.

The **correct** answer is :

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

30. Which of the following are control/handshake signal in mode 1 of 8255 ?

- (a) OBF (b) IBF (c) STB (d) BSR

Code :

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



31. Which of the following statements are correct about the program given below ?

```
# include <stdio.h>
int main()
{
union a
{
int x;
Char C[2];
};
union a K1={1 2 3};
union a K2={1,2 3};
return 0;
}
```

- (a) K2 cannot be initialized as shown
- (b) K1 can be initialized as shown
- (c) to initialize char C[] of K2 '.' operator should be used
- (d) results in syntax error

The correct answer is :

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

32. Consider the following definition of array in C :

```
int a [ ] [2] [3]=
{
{
{1, 2, 3},
{4, 5, 6}
},
{
{10, 20, 30},
{40, 50, 60}
},
{
{100, 200, 300},
{400, 500, 600}
}
};
```

Which of the following expressions would give value 1 for the array defined above ?

- (a) a[0] [0] [0] (b) *** a (c) *** a[0] (d) ** a[0] [0]

The correct answer is :

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



33. A Series inverter with series Load deliver a load power of 1 kW at resonance. The value of Load resistance = 10Ω and resonant frequency is 20 kHz, Q factor = 3.85.

For this, the value of Capacitor and inductor are estimated. Following are the values of L and C :

- (a) $L = 306.37 \mu\text{H}$ (b) $C = 0.2067 \mu\text{F}$
 (c) $L = 3.06 \mu\text{H}$ (d) $C = 20.67 \mu\text{F}$

Out of above, which are **correct** ?

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

34. In SONET standards, following are the data rates and payloads :

- (a) SONET - OC - 1 data rate 51.84 Mbps
 (b) OC - 1, payload 40.112 M bits/s
 (c) OC - 1 data rate 50.112 Mbps
 (d) OC - 1 payload 50.112 Mbps

Which of the above is correct for OC - 1 ?

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

35. Consider the following formulas with all the symbols having usual meanings :

- (a) $P_t = P_c \left(1 + \frac{m}{2} \right)$ (b) $I_t = I_c \left(1 + \frac{m^2}{2} \right)^{1/2}$
 (c) $P_t = P_c \left(1 + \frac{m^2}{2} \right)$ (d) $I_t = I_c \left(1 + \frac{m}{2} \right)^{1/2}$

Which of the above are **incorrect** ?

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

36. Read the following statements :

- (a) A channel is said to be ideal, if, within the bandwidth occupied by the transmitted signal, the amplitude response is constant and phase response is a linear function of frequency.
 (b) A channel is said to be ideal, if, within the bandwidth occupied by the transmitted signal, both amplitude and phase response are linear function of frequency.
 (c) It is possible to compensate for the non-ideal frequency response characteristics of the channel by use of filter at the demodulator.
 (d) A non-ideal channel does not exist.

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

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



37. An X - band pulse cylindrical magnetron has following parameters :

Anode voltage = 26kV, Beam current = 27A, Magnetic flux density = 0.336 Wb/m²
Radius of Cathode Cylinder = 5 cm, Radius of Vane edge to center = 10 cm.

Following data regarding angular frequency and Cut off voltage is given.

- (a) angular frequency = 5.91×10^{10} rad
- (b) Cut off voltage = 139.50 kV
- (c) angular frequency = 3.91×10^9 radian
- (d) Cut off voltage = 239.39 kV

Which is a **correct** option ?

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

38. A TE₁₁ mode is propagating through a circular waveguide of radius of 5 cm. The dielectric in the waveguide is air. For this following are the datas.

- (a) Cut off wave number = 38.62 (b) Cut off frequency = 1.758 GHz
- (c) Cut off wave number = 36.82 (d) Cut off frequency = 2.758 GHz

Out of these following are **correct** :

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

39. Read the following statements :

- (a) A function G(s) of the complex variables 'S' is called an analytic function in a region of the S-plane if the function and all its derivatives exist in the region.
- (b) A function G(s) of the complex variable 'S' is called an analytic function in a region of the S-plane if function and all its derivatives do not exist in the region.
- (c) The singularities of a function are the points in the S-plane at which the function and its derivatives do not exist.
- (d) The singularities of a function are the points in the S-plane at which the function and its derivatives exist.

Which of the above statements are **not correct** ?

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



40. A force with which the plates of a parallel plate capacitor having charge Q and area of each plate A , attract each other is :

- (a) Directly proportional to Q (b) Inversely proportional to Q
 (c) Directly proportional to Q^2 (d) Inversely proportional to A

Which of the above are **correct** ?

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

41. Match the following list :

List - I

List - II

- | | |
|--|------------|
| (a) Maximum efficiency of a Class B amplifier | (i) 100% |
| (b) Maximum efficiency of a Class A amplifier | (ii) 78.5% |
| (c) Maximum efficiency of a Class C amplifier | (iii) 50% |
| (d) Rectification efficiency of half wave rectifier when $r_d \ll R_L$ | (iv) 40.6% |

Correct code is :

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

42. Match the following list :

List - I

List - II

- | | |
|--------------|---|
| (a) z_{11} | (i) $\left. \frac{V_2}{I_2} \right _{\text{at } I_1 = 0}$ |
| (b) h_{11} | (ii) $\left. \frac{V_1}{I_1} \right _{\text{at } V_2 = 0}$ |
| (c) h_{22} | (iii) $\left. \frac{V_1}{I_1} \right _{\text{at } I_2 = 0}$ |
| (d) z_{22} | (iv) $\left. \frac{I_2}{V_2} \right _{\text{at } I_1 = 0}$ |

Correct code is :

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

43. Match the following list :

List - I

- (a) Boltzman Approximation gives
- (b) Total number of holes in valence band
- (c) Position of Fermi level
- (d) Debye screening length

List - II

- (i) $\left[\frac{KT}{q^2 n} \epsilon_s \epsilon_0 \right]^{\frac{1}{2}}$
- (ii) $\int_{-\infty}^{E_v} g_v(E) f_h(E) dE$
- (iii) $\frac{E_c + E_v}{2} + KT \left[\frac{m_h^*}{m_e^*} \right]^{\frac{3}{4}}$
- (iv) $f_e(E) = \exp[-(E - E_f)/kT]$

Correct code is :

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

44. Match the following list :

List - I

(Boolean logic function)

- (a) $ab + bc + ca$
- (b) $ab + \bar{a}\bar{b} + \bar{c}$
- (c) $a + bc$
- (d) $(\bar{a} + \bar{b} + \bar{c})(a + \bar{b} + \bar{c})(\bar{a} + \bar{b} + c)$

List - II

(Inverse of function)

- (i) $\bar{a}(\bar{b} + \bar{c})$
- (ii) $\bar{a}\bar{b} + \bar{b}\bar{c} + \bar{c}\bar{a}$
- (iii) $(a \oplus b)c$
- (iv) $abc + \bar{a}bc + abc$

Correct code is :

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



45. Match the following list :

List - I

List - II

- | | |
|----------|---------------------------------------|
| (a) PCON | (i) contains status information |
| (b) TMOD | (ii) timer/counter control register |
| (c) TCON | (iii) idle bit, power down bit |
| (d) PSW | (iv) timer/counter modes of operation |

Correct code is :

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

46. Match the following list :

List - I

List - II

(Storage class)

(Storage, initial - value, scope)

- | | |
|--------------|------------------------------|
| (a) auto | (i) register, garbage, local |
| (b) register | (ii) memory, zero, global |
| (c) static | (iii) memory, garbage, local |
| (d) extern | (iv) memory, zero, local |

Correct code is :

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



47. Match the following lists in terms of Microwave bands :

List - I	List - II
(Bands)	(Frequency)
(a) UHF	(i) 300 - 3000 kHz
(b) MF	(ii) 26 - 40 GHz
(c) K _a	(iii) 4 - 8 GHz
(d) C	(iv) 300 - 3000 MHz

Correct code is :

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

48. Match the following list :

List - I	List - II
(a) Super heterodyne Receiver	(i) Granular Noise
(b) PCM	(ii) Image frequency
(c) Delta modulation	(iii) Frequency discrimination
(d) FM	(iv) Quantization Noise

Correct code is :

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



49. Match the following list :

List - I

- (a) Mach - Zehnder
- (b) On - Off Keying
- (c) SRS
- (d) Dispersion

List - II

- (i) Direct - modulation
- (ii) Stimulated emission
- (iii) Pulse broadening
- (iv) Indirect modulator

Correct code is :

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

50. Match the following list :

List - I

- (a) Tachogenerator
- (b) LVDT
- (c) Synchro
- (d) Servo motors

List - II

- (i) Electrical to mechanical signal
- (ii) Rotating transformer
- (iii) Displacement into voltage
- (iv) Rotary motion into electrical signal

Correct code is :

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

51. A given semiconductor is doped by phosphorous at different doping concentrations (given below).

- | | |
|--|--|
| (a) $2 \times 10^{12} \text{ cm}^{-3}$ | (b) $4 \times 10^{14} \text{ cm}^{-3}$ |
| (c) $3 \times 10^{13} \text{ cm}^{-3}$ | (d) $2 \times 10^{15} \text{ cm}^{-3}$ |

Sequence them in terms of decreasing conductivity :

- | | |
|------------------------|------------------------|
| (1) (a), (b), (c), (d) | (2) (d), (b), (c), (a) |
| (3) (b), (a), (d), (c) | (4) (d), (c), (a), (b) |



52. What are the steps required in sequence to solve a circuit using super position theorem ?
- Select any one source and short circuit all other voltage sources.
 - Find out the current or voltage across the required element, due to the source under consideration.
 - Open all current sources, if internal impedance is not known. If known replace them by their impedances.
 - Add all the individual effects produced by individual sources to obtain the total current in or across the voltage element.

Code :

- | | |
|------------------------|------------------------|
| (1) (a), (c), (b), (d) | (2) (a), (b), (c), (d) |
| (3) (c), (a), (b), (d) | (4) (a), (d), (c), (b) |

53. Following are the amplifying systems available.

- | | |
|-----------------------------|-----------------------------|
| (a) CB transistor amplifier | (b) CC transistor amplifier |
| (c) CE transistor amplifier | (d) OP Amp |

Sequence in terms of increasing order of voltage gain.

- | | |
|------------------------|------------------------|
| (1) (b), (a), (c), (d) | (2) (d), (c), (a), (b) |
| (3) (a), (b), (c), (d) | (4) (c), (d), (b), (a) |

54. The correct sequence of shifting binary number through bidirectional shift register is :

- All the lower registers are reset i.e. set = 0 by giving a pulse at the reset terminals.
- The contents of the lower register are gated up directly to the upper register.
- The upper register is reset for the next shift operation.
- The contents of the upper register are gate down to the lower register either one position to the right or to the left as desired.

Code :

- | | |
|------------------------|------------------------|
| (1) (a), (c), (b), (d) | (2) (b), (a), (c), (d) |
| (3) (b), (a), (d), (c) | (4) (a), (c), (d), (b) |



55. Arrange the following operations of DMA to transfer a block of data.
- (a) Terminal count register is decremented by one with each byte of data transfer till it reaches to zero.
 - (b) DMA controller acquires bus system and starts transferring the data.
 - (c) Microprocessor suspends its operations, release the buses and generates HLDA.
 - (d) DMA controller sends HOLD

The **correct** sequence is :

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

56. Arrange the following operators in the precedence order of highest to lowest :

- (a) = = (b) + + (c) % (d) &

The **correct** order of precedence is :

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

57. Following are various layers in atmosphere used for communications :

- (a) F₂ Layer (b) D layer (c) F₁ Layer (d) E Layer

Arrange these in terms of descending order of their height from earth.

The **correct** sequence is :

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

58. Consider the following detector circuits.

- (a) Diode detector (b) Slope detector
(c) Balanced slope detector (d) Ratio detector

Arrange the above detectors in decreasing order of their circuit complexity :

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



59. Following are the wavelength bands used in optical communication systems.

- (a) Long (L) Band (b) Conventional band (C band)
(c) Extended band (E band) (d) Original band (O-band)

Arrange them in increasing order of wavelengths. The correct sequence is :

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

60. Consider the following piezoelectric materials.

- (a) Quartz (b) Tourmaline (c) Lithium sulphate

Arrange the above piezoelectric materials in decreasing order of their useful temperature ranges :

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

Directions : Question No. 61 to 70 :

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.

Code :

- (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) :

A p-n junction diode with low junction depth can be used as solar cell when illuminated by suitable light (wavelength) at top thin layer above the junction.

Reason (R) :

A p-n junction diode under no condition can be used as solar cell. It can be used only as light emitting diode for optoelectronic applications.

62. Assertion (A) :

Superposition theorem can be used to find the output of a full wave rectifier excited by sinusoidal signal sources of different frequencies connected in series.

Reason (R) :

Superposition theorem is valid for all linear systems.

63. Assertion (A) :

A UJT (Unijunction Transistor) finds application in making relaxation oscillator of certain given frequency.

Reason (R) :

It has three terminals like that of a transistor - corresponding to emitter base and collector. Therefore it can be used to make oscillator as well as amplifier.

64. Assertion (A) :

It is possible that a digital circuit gives the same output for different input voltages.

Reason (R) :

A digital circuit is also called logic circuit.

65. Assertion (A) :

The address bus size in 8086 is 20 bit.

Reason (R) :

Registers size of 8086 microprocessor is 16 bit.

66. Assertion (A) :

C++ is object - oriented programming language.

Reason (R) :

C++ supports class, inheritance, templates and exception handling.



67. Assertion (A) :

In power electronics, converters feel stress during the operation beyond their ratings.

Reason (R) :

The snubber circuits are used to increase the applied voltage across the devices during turn off transients.

68. Assertion (A) :

Sampling theorem forms the basis for the relation between continuous time signals and discrete time signals.

Reason (R) :

If the sampling is done at Nyquist rate, the signal $x(t)$ can be reconstructed from the sample values $x[n] = x[nT_s]$; $-\infty \leq n \leq \infty$.

69. Assertion (A) :

A reflex Klystron is a single cavity Klystron that overcomes the disadvantages of two cavity Klystron oscillator.

Reason (R) :

It is high power microwave generator operating beyond 60 GHz and generating powers in kW. Its efficiency is very high of the order of 70%.

70. Assertion (A) :

Capacitive transducers are, infact, primary transducers for measurement of displacements.

Reason (R) :

A Capacitive transducer is a non loading, non contact and non-invasive type transducer for displacement measurements.

Based on the paragraph given below answer Q. 71 to 75 :

The traditional methods of combinational circuits involve simplification and realization using gates. Using these methods, complex functions have been integrated and are easily available in IC form. There is an attractive array of devices like multiplexer, demultiplexer, decoders, comparators, parity generators/checkers, which significantly reduce IC package count there by reducing the system cost. The system design is greatly simplified because the laborious and time consuming simplification methods are generally not required with these devices. This also improves the reliability of the system by reducing the number of external wired connection. But they have some limitations as well. Different memories like ROM, PROM can also be used to implement combinational circuits without much simplification.

71. The minimum number of selection lines required for selecting one of the 16 inputs are :

- (1) 4 (2) 2 (3) 8 (4) 16

72. A logic circuit required for converting BCD Code to 7 segment Code is known as :

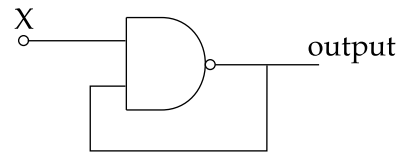
- (1) Multiplexer (2) Demultiplexer (3) Decoder (4) Encoder

73. In a BCD Subtractor if the sum of minuend and the nine's complement of subtrahend is not a valid BCD Code, then which binary number is added to the sum to get the correct answer ?

- (1) 1000 (2) 0001 (3) 0110 (4) 0111

74. Consider the following digital circuits :

- (a) Multiplexers (b) Read only memories
(c) D - Latch (d) Circuit as shown



Which of these come under the class of combinational circuits only ?

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

75. A ROM is to be used to implement a "Squarer", which outputs the square of a 3-bit number. What must be the size of the ROM ?

- (1) 8 - address lines and 9 data lines
(2) 3 - address lines and 6 data lines
(3) 3 - address lines and 9 data lines
(4) 8 - address lines and 6 data lines

- o O o -

Space For Rough Work

