

Test Booklet Code & No.

प्रश्नपत्रिका कोड व क्र.

B**Paper-III****ELECTRONIC SCIENCE****Signature and Name of Invigilator**

Seat No.

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1. (Signature)

(In figures as in Admit Card)

(Name)

Seat No.

(In words)

2. (Signature)

(Name)

OMR Sheet No.

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(To be filled by the Candidate)

MAY - 38316**Time Allowed : 2½ Hours]****[Maximum Marks : 150****Number of Pages in this Booklet : 24****Number of Questions in this Booklet : 75****Instructions for the Candidates**

- Write your Seat No. and OMR Sheet No. in the space provided on the top of this page.
- This paper consists of **75** objective type questions. Each question will carry **two** marks. All questions of Paper-III will be compulsory, covering entire syllabus (including all electives, without options).
- At the commencement of examination, the question booklet will be given to the student. In the first 5 minutes, you are requested to open the booklet and compulsorily examine it as follows :
 - 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 or 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 missing pages/questions or questions repeated or not in serial order or any other discrepancy should not be accepted and correct booklet should be obtained from the invigilator within the period of 5 minutes. Afterwards, neither the Question Booklet will be replaced nor any extra time will be given. The same may please be noted.**
 - After this verification is over, the OMR Sheet Number should be entered on this Test Booklet.
- Each question has four alternative responses marked (A), (B), (C) and (D). You have to darken the circle as indicated below on the correct response against each item.
Example : where (C) is the correct response.

(A)	(B)	(C)	(D)
-----	-----	-----	-----
- Your responses to the items are to be indicated in the **OMR Sheet given inside the Booklet only**. If you mark 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 at the end of this booklet.
- If you write your Name, Seat 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, you will render yourself liable to disqualification.
- You have to return original OMR Sheet to the invigilator at the end of the examination compulsorily and must not carry it with you outside the Examination Hall. You are, however, allowed to carry the Test 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 is no negative marking for incorrect answers.**

विद्यार्थ्यांसाठी महत्वाच्या सूचना

- परिक्षार्थींनी आपला आसन क्रमांक या पृष्ठावरील वरच्या कोपऱ्यात लिहावा. तसेच आपणांस दिलेल्या उत्तरपत्रिकेचा क्रमांक त्याखाली लिहावा.
- सदर प्रश्नपत्रिकेत **75** बहुपर्यायी प्रश्न आहेत. प्रत्येक प्रश्नास **दोन** गुण आहेत. या प्रश्नपत्रिकेतील **सर्व** प्रश्न सोडविणे अनिवार्य आहे. सदरचे प्रश्न हे या विषयाच्या संपूर्ण अभ्यासक्रमावर आधारित आहेत.
- परीक्षा सुरु झाल्यावर विद्यार्थ्यांना प्रश्नपत्रिका दिली जाईल. सुरुवातीच्या 5 मिनीटांमध्ये आपण सदर प्रश्नपत्रिका उघडून खालील बाबी अवश्य तपासून घ्याव्यात.
 - प्रश्नपत्रिका उघडण्यासाठी प्रश्नपत्रिकेवर लावलेले सील उघडावे. सील नसलेली किंवा सील उघडलेली प्रश्नपत्रिका स्विकारू नये.
 - पहिल्या पृष्ठावर नमूद केल्याप्रमाणे प्रश्नपत्रिकेची एकूण पृष्ठे तसेच प्रश्नपत्रिकेतील एकूण प्रश्नांची संख्या पडताळून घ्यावी. पृष्ठे कमी असलेली/कमी प्रश्न असलेली/प्रश्नांचा चुकीचा क्रम असलेली किंवा इतर त्रुटी असलेली सदोष प्रश्नपत्रिका सुरुवातीच्या 5 मिनिटातच पर्यवेक्षकाला परत देऊन दुसरी प्रश्नपत्रिका मागवून घ्यावी. त्यानंतर प्रश्नपत्रिका बदलून मिळणार नाही तसेच वेळी वाढवून मिळणार नाही याची कृपया विद्यार्थ्यांनी नोंद घ्यावी.**
 - वरीलप्रमाणे सर्व पडताळून पहिल्यानंतरच प्रश्नपत्रिकेवर ओ.एम.आर. उत्तरपत्रिकेचा नंबर लिहावा.
- प्रत्येक प्रश्नासाठी (A), (B), (C) आणि (D) अशी चार विकल्प उत्तरे दिली आहेत. त्यातील योग्य उत्तराचा रकाना खाली दर्शविल्याप्रमाणे ठळकपणे काळ/निळ्या करवा.
उदा. : जर (C) हे योग्य उत्तर असेल तर.

(A)	(B)	(C)	(D)
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- या प्रश्नपत्रिकेतील प्रश्नांची उत्तरे ओ.एम.आर. उत्तरपत्रिकेतच दर्शवावीत. इतर ठिकाणी लिहीलेली उत्तरे तपासली जाणार नाहीत.
- आत दिलेल्या सूचना काळजीपूर्वक वाचाव्यात.
- प्रश्नपत्रिकेच्या शेवटी जोडलेल्या कोऱ्या पानावरच कच्चे काम करावे.
- जर आपण ओ.एम.आर. वर नमूद केलेल्या ठिकाणा व्यतिरिक्त इतर कोठेही नाव, आसन क्रमांक, फोन नंबर किंवा ओळख पटेल अशी कोणतीही खुण केलेली आढळून आल्यास अथवा असभ्य भाषेचा वापर किंवा इतर गैरमार्गाचा अवलंब केल्यास विद्यार्थ्यांना परीक्षेस अपात्र ठरविण्यात येईल.
- परीक्षा संपल्यानंतर विद्यार्थ्यांनी मूळ ओ.एम.आर. उत्तरपत्रिका पर्यवेक्षकांकडे परत करणे आवश्यक आहे. तथापी, प्रश्नपत्रिका व ओ.एम.आर. उत्तरपत्रिकेची द्वितीय प्रत आपल्याबरोबर नेण्यास विद्यार्थ्यांना परवानगी आहे.
- फक्त निळ्या किंवा काळ्या बॉल पेनचाच वापर करावा.**
- कॅलक्युलेटर किंवा लॉग टेबल वापरण्यास परवानगी नाही.**
- चुकीच्या उत्तरासाठी गुण कपात केली जाणार नाही.**

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Electronic Science

Paper III

Time Allowed : 2½ Hours]**[Maximum Marks : 150**

Note : This Paper contains **Seventy Five (75)** multiple choice questions, each question carrying **Two (2)** marks. Attempt *All* questions.

1. Simplification of Boolean expression : $\bar{A}\bar{B}\bar{C} + \bar{A}B\bar{C} + A\bar{B}\bar{C} + ABC\bar{C}$ leads. (A) A (B) $\bar{B}$ (C) $\bar{C}$ (D) $\bar{A}B$ 2. High packing density is the feature of the following logic family : (A) RTL (B) DTL (C) TTL (D) IIL	3. Match the pairs and select the <i>correct</i> answer from codes given below : List I (a) Counter method ADC (b) SAR ADC (c) Integrating ADC (d) Flash ADC List II (i) Low noise (ii) Slow (iii) Expensive (iv) N-clock cycles Codes : <table style="width: 100%; text-align: center;"> <tr> <td></td><td>(a)</td><td>(b)</td><td>(c)</td><td>(d)</td></tr> <tr> <td>(A)</td><td>(ii)</td><td>(i)</td><td>(iv)</td><td>(iii)</td></tr> <tr> <td>(B)</td><td>(ii)</td><td>(iv)</td><td>(i)</td><td>(iii)</td></tr> <tr> <td>(C)</td><td>(iv)</td><td>(ii)</td><td>(iii)</td><td>(i)</td></tr> <tr> <td>(D)</td><td>(i)</td><td>(iii)</td><td>(ii)</td><td>(iv)</td></tr> </table>		(a)	(b)	(c)	(d)	(A)	(ii)	(i)	(iv)	(iii)	(B)	(ii)	(iv)	(i)	(iii)	(C)	(iv)	(ii)	(iii)	(i)	(D)	(i)	(iii)	(ii)	(iv)
	(a)	(b)	(c)	(d)																						
(A)	(ii)	(i)	(iv)	(iii)																						
(B)	(ii)	(iv)	(i)	(iii)																						
(C)	(iv)	(ii)	(iii)	(i)																						
(D)	(i)	(iii)	(ii)	(iv)																						

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4. Match the following List I with List II and select the *correct* answer using codes given below :

List I

- (a) De-multiplexer
- (b) Multiplexer
- (c) A decade counter requires
- (d) IC 7490

List II

- (i) Routes out many data input with single data output
- (ii) Data selection
- (iii) Decade counter
- (iv) Four flip-flops

Codes :

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

5. The following memory cannot be programmed by the user :
- (A) ROM
 - (B) PROM
 - (C) EPROM
 - (D) EEPROM

6. Number of flip-flops needed to construct a shift register capable of storing decimal numbers upto 32 are :

- (A) 5
- (B) 6
- (C) 4
- (D) 3

7. Addressing modes in a micro-processor :

- (A) Generate the addresses of the operands
- (B) Address the CPU
- (C) Signify the memory map
- (D) Set the carry flag

8. A 2k memory chip is interfaced to 8085 with All-A13 lines used for chip select. Which of the following would be valid address range for the memory chip ?

- (A) 0000H
07FFH
- (B) 0800H
08FFH
- (C) 0000H
FFFFH
- (D) 1000H
17FFH

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9. 8-bit data lines are not employed by the following processor :
- (A) 8080
 - (B) 8086
 - (C) 8085
 - (D) 8051
10. Which of the following is true about MOVC instruction in 8051 microcontroller :
- (A) used for reading from program memory
 - (B) uses indexed addressing technique
 - (C) both (A) and (B)
 - (D) uses the register addressing
11. Translation of assembly code to object code is performed by the :
- (A) Compiler
 - (B) Assembler
 - (C) Linker
 - (D) Locator
12. Which data communication method is used for sending data in both the directions, once at a time ?
- (A) simplex
 - (B) full duplex
 - (C) half duplex
 - (D) super simplex
13. Timers in microcontroller 8051 can not be used for :
- (A) Generation of wave forms
 - (B) Generation of PWM
 - (C) Measurement of time (ON, OFF and frequency) of input signals with gate control
 - (D) As a counter (B) and (C) above
14. The following C program segment is executed the output will be :
- ```
if (gameOver==0)
 if(player To Move==you)
 printf("Your Move\n");
 else
 printf("My Move\n");
```
- (A) If gameOver is 0 then My Move
  - (B) If gameOver is 1 and player to Move is you then My Move
  - (C) If gameOver is 0 and player To Move is you then Your Move
  - (D) Compilation Error

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15. What output would you expect from the following program ?

```
include <stdio.h>

int main(void)
{
 char c, d;

 c='d';

 d=c;

 printf("d=%c\n",d);

 return 0;
}
```

- (A) d=0  
(B) d=d  
(C) d=c  
(D) c=d
16. Which one of the program execution phases is *correct* order ?
- (A) Edit, Link, Compile, Execute  
(B) Link, Edit, Execute, Compile  
(C) Execute, Edit, Link, Compile  
(D) Edit, Compile, Link, Execute

17. In the simplest form of the if statement;

if(expression) statement

- (A) the 'statement' will be executed only if 'expression' has zero value  
(B) the 'statement' will be ignored if the 'expression' is true  
(C) the 'expression' must not be placed in parentheses  
(D) the 'expression' must be placed in parenthesis

18. Match List I with List II and select the *correct* answer using codes given below the list :

**List I**

- (a) strcat  
(b) strncmp  
(c) strncat  
(d) strcmp

**List II**

- (i) compares a portion of one string with portion of another string  
(ii) appends one string to another  
(iii) compares two strings  
(iv) appends a portion of one string to another

**Codes :**

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

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19. The unions .....

- (A) are useful for applications involving multiple members, where values need not be assigned to all of the members at any one time
- (B) contain members whose individual data types must not differ from one another
- (C) are not used to conserve memory
- (D) contain members those never share the same storage area within the computer's memory

20. For a load terminated on a transmission line,  $Z_n$  is represented on a Smith chart with  $|\rho_v| = 0.3$  and  $\theta_v = 60^\circ$ . The admittance must be :

- (A)  $\frac{1 + j\frac{\sqrt{3}}{2}}{1 - j\frac{\sqrt{3}}{2}}$
- (B)  $\frac{1 - j\frac{\sqrt{3}}{2}}{1 + j\frac{\sqrt{3}}{2}}$
- (C)  $\frac{0.85 - j\frac{\sqrt{3}}{2}}{0.85 + j\frac{\sqrt{3}}{2}}$
- (D)  $\frac{1.15 + j\frac{\sqrt{3}}{2}}{0.85 - j\frac{\sqrt{3}}{2}}$

21. A microwave cavity has dimensions

 $l \times p \times s \text{ cm}^3$ . The material has askin depth  $\delta \text{ cm}$ . The energy loss is

proportional to :

- (A)  $\delta \times l \times p \times s$
- (B)  $(l \times p + p \times s + l \times s) \times \delta$
- (C)  $\frac{(l \times p \times s) \times \delta}{(l \times p + p \times s + s \times l)}$
- (D)  $\frac{(l \times p + s \times p) \times \delta}{l \times s}$

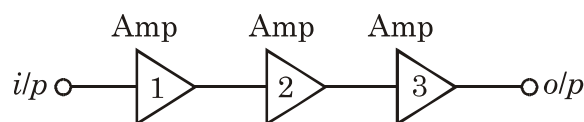
22. .... is not the digital modulation

technique.

- (A) phase shift modulation
- (B) frequency shift modulation
- (C) amplitude shift keying
- (D) orthogonal angular modulation

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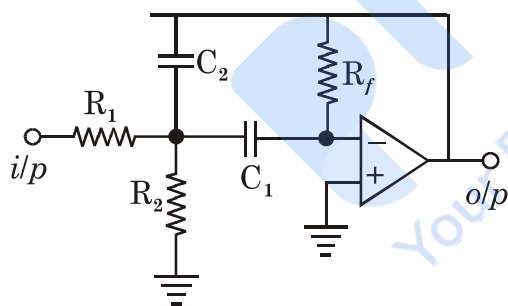
23. The RF amplifiers are cascaded as shown in the following figure. Noise factor and gain (not in dB) of each amplifier are also given. The total noise factor ( $F_{\text{tot}}$ ) in dB at the output of amplifier chain is :



$$F_1 = 20 \quad F_2 = 20 \quad F_3 = 20$$

$$G_1 = 20 \quad G_2 = 50 \quad G_3 = 50$$

- (A) 20.97 dB  
(B) 42 dB  
(C) 13.22 dB  
(D) 26.44 dB
24. Identify the following circuit :



- (A) Chebychev active band pass filter  
(B) Butterworth active band pass filter  
(C) Chebychev high pass filter  
(D) Butterworth active low pass filter

25. Match List I with List II and select the *correct* answer using codes given below :

### List I

- (a) Television  
(b) Radio  
(c) Radar  
(d) Data communication

### List II

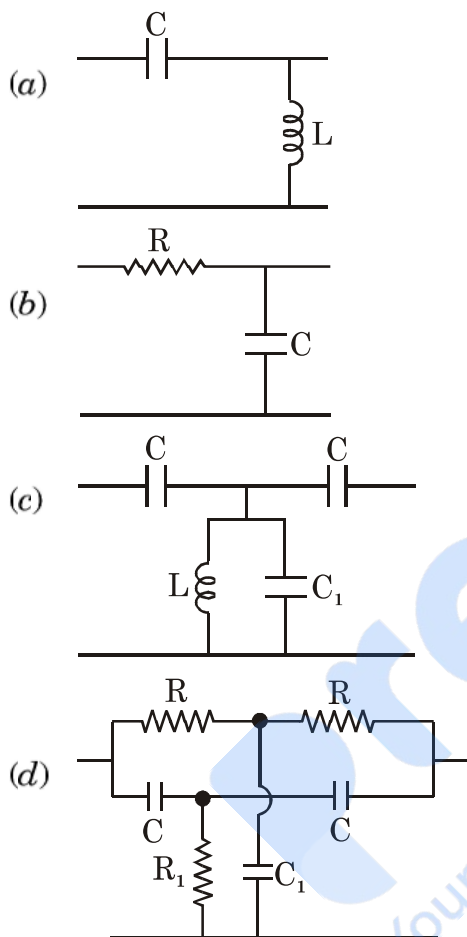
- (i) Either AM or FM is used  
(ii) Both AM and FM are used  
(iii) PCM is used  
(iv) Digital system

### Codes :

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

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26. Match List I with List II and select the *correct* answer using codes given below :

**List I****List II**

- (i) band reject (notch) filter  
(ii) band pass filter  
(iii) high pass filter  
(iv) low pass filter

**Codes :**

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

27. Match List I with List II and select the *correct* answer using codes given below :

**List I**

- (a) Detection of a periodic signal in noise  
(b) Recovery of a band limited signal from its uniformly sampled value  
(c) Finer quantization  
(d) Delta modulation

**List II**

- (i) Increase in bandwidth  
(ii) Slope overload error  
(iii) Nyquist rate of signals  
(iv) Cross correlation

**Codes :**

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

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28. Match List I with List II and select the *correct* answer using codes given below :

**List I**

- (a) IF noise
- (b) Image frequency
- (c) Station selector
- (d) Excessive hum

**List II**

- (i) ganged tuning
- (ii) spurious response
- (iii) leaky filter capacitor
- (iv) mixer stage

**Codes :**

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

29. The breakdown voltage of an UJT is 6V, if  $V_{BB} = 10$  V, its intrinsic stand off ratio is :

- (A) 0.51
- (B) 0.54
- (C) 0.67
- (D) 1.66

30. For a 3-phase semiconverter, the maximum average output voltage that occurs at a delay angle of  $\alpha = 0$ , is :

- (A)  $\frac{3\sqrt{3}V_m}{\pi}$
- (B)  $\frac{3\sqrt{3}V_m}{2\pi}$
- (C)  $\frac{3V_m}{\pi}$
- (D)  $\frac{3V_m}{2\pi}$

31. If the two or more choppers are operated in parallel and are phase shifted through  $\frac{\pi}{\mu}$ , the amplitude of the load current ripples :

- (A) increases and the ripple frequency decreases
- (B) increases and the ripple frequency also increases
- (C) decreases and the ripple frequency increases
- (D) decreases and the ripple frequency also decreases

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32. The lowest order mode in a optical fiber is :

- (A)  $HE_{00}$
- (B)  $HE_{11}$
- (C)  $EH_{01}$
- (D)  $EH_{00}$

33. The following is the passive display device :

- (A) CRT
- (B) Plasma
- (C) LED
- (D) LCD

34. Standard DMM cannot be used for measuring output of ..... transducer.

- (A) Thermistor
- (B) Thermocouple
- (C) Piezoelectric
- (D) Potentiometric

35. Match List I with List II and select the *correct* answer using codes given below :

**List I**

- (a) thermistor
- (b) Photoelectric
- (c) Potentiometer
- (d) Platinum resistance thermometer

**List II**

- (i) Linear
- (ii) PTC
- (iii) Hysteresis
- (iv) High speed

**Codes :**

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

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36. The time base of a CRO is controlled by :

- (A) square waveform
- (B) sine waveform
- (C) sawtooth waveform
- (D) staircase waveform

37. Match List I (system) with List II (Transfer function) and select the *correct* answer using codes given below :

**List I**

- (a) AC servomotor
- (b) DC amplifier
- (c) Lead network
- (d) Lag network

**List II**

- (i)  $\frac{(s+z)}{(s+p)} \cdot (z < p)$
- (ii)  $\left( \frac{1+T_1s}{1+T_2s} \right) \cdot (T_1 < T_2)$
- (iii)  $\frac{k}{1+Ts}$
- (iv)  $\frac{k}{s(1+Ts)}$

**Codes :**

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

38. The first two rows of Routh's tabulation of 4th order are :

|       |   |    |   |
|-------|---|----|---|
| $s^4$ | 1 | 10 | 5 |
| $s^3$ | 2 | 10 |   |

The number of roots of the system lying on the right side of s-plane is :

- (A) zero
- (B) 2
- (C) 3
- (D) 4

**Instructions (39 to 50) :**

Assertion-Reason type questions :

The following items consist of two statements, one labelled as 'Assertion (A)', and the other labelled the 'Reason (R)'. You are to examine these two statements and decide if the Assertion (A) and the Reason (R) are individually true and if so,

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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 sheet accordingly.

*Codes :*

- (A) Both (A) and (R) are true and (R) is the correct explanation of (A)
- (B) Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (C) (A) is true but (R) is false
- (D) (A) is false and (R) is true

39. **Assertion (A) :** Electronic transport in semiconductor devices occurs through drift and diffusion.

**Reason (R) :** The dopant concentration in all of them is uniform.

40. **Assertion (A) :** Poles and zeroes must be conjugate if imaginary or complex.

**Reason (R) :** The real part of poles must be -ve or zero for stability.

41. **Assertion (A) :** The Wein Bridge can be used for frequency measurements.

**Reason (R) :** The Wien bridge uses only capacitors and resistors.

42. **Assertion (A) :** A demultiplexer cannot be used as decoder.

**Reason (R) :** A demultiplexer is built using AND gates only.

43. **Assertion (A) :** 8085/8051 allow only upto 256 I/O devices to be accessed directly using I/O mapped I/O, whereas with memory mapped I/O the number can be extended in principle to 64 k.

**Reason (R) :** In the I/O mapped I/O 16 bit address is used whereas the memory mapped I/O uses 8-bit address.

44. **Assertion (A) :** Scanf and printf functions are not defined in a C program.

**Reason (R) :** They are already defined in a header file <stdio.h>

45. **Assertion (A) :** on the Smith chart;  $|\rho_v|$  where  $\rho_v$  is the reflection coefficients is same as VSWR.

**Reason (R) :** Smith chart is representation of  $Z_n = \frac{Z_L}{Z_0}$  on the complex  $\rho_v$  plane.

46. **Assertion (A) :** Channel capacity for communication can be increased by TDMA, FDMA and CDMA.

**Reason (R) :** Radio and Television are both broadcasting systems.

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47. **Assertion (A) :** Stepper motor shaft remains stationary after moving through a specific step angle.

**Reason (R) :** Due to construction, the stepper motor has a large holding torque.

48. **Assertion (A) :** Optical communication has shifted from 1300 nm to 1550 nm in silica fiber.

**Reason (R) :** Dispersion and attenuation are both minimum at 1550 nm.

49. **Assertion (A) :** Semiconductor strain gauges are highly sensitive.

**Reason (R) :** Semiconductor strain gauges are sensitive to humidity.

50. **Assertion (A) :** Plot of logarithmic gain of a system *versus* logarithm of frequency is known as Bode plot and simplifies analysis of frequency response.

**Reason (R) :** The corner frequencies obtained from the Bode plot represent the system performance.

**Instructions (Q. Nos. 51 to 55) :** Read the following paragraph and answer question nos. 51 to 55 :

A transmission line may be defined as a device for transmitting or

guiding energy from one point to another. The energy may be for lighting, heating or performing work, or it may be in the form of signal information (speech, pictures data, music). Basically a transmission line has two terminals into which power (or information) is fed and two terminals from which power (or information) is received. Thus, a transmission line may be regarded as a four-terminal device for connecting any and all electrical devices.

The power cord on a lamp or appliance is a transmission line and so are the wires from a generating station to a factory or home. Telephone and telegraph wires, audio, video and radio cables and the myriad nerve fibres in our bodies are all transmission lines. The interconnections of all electric circuits are transmission lines and in broad sense waveguides and optical fibers and even radio links may be regarded as transmission lines.

Transmission lines are everywhere and are infinite variety but

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regardless of type, length or construction, all operate according to the same basic principles.

It is convenient to classify transmission lines into three main groups :

(1) those with transverse electromagnetic (TEM) modes (2) those with higher order modes (3) those with transverse electromagnetic space waves (as in radio link). In a TEM mode both the electric and magnetic fields are entirely transverse to the direction of propagation. There is no component of either E or H in the direction of transmission. Higher order modes, on the other hand, always have at least one field component in the direction of transmission. All two-conductor lines such as co-axial or two-wire transmission lines are examples of TEM-mode types, while hollow single-conductor waveguides or dielectric rods are examples of higher mode types.

51. Transmission lines are used for .....

- (A) generation of energy at required point
- (B) generation of energy for lighting, heating or performing work
- (C) detecting signal information such as speech, pictures, data music
- (D) guiding energy from one point to another

52. Which of the following statements is *correct* ?

- (A) The transmission lines basically transmit the energy in the form of speech only
- (B) the myriad nerve fibres in our bodies, optical fibres and waveguides are not the transmission lines
- (C) A radio link, the power cord on a lamp and wires from generating stations to a factory are examples of transmission line
- (D) Basically the transmission line should have four-terminals from which power (or information) is received

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53. Which of the following doesn't support the transverse electromagnetic mode ?  
 (A) coaxial line  
 (B) two-wire transmission line  
 (C) hollow single-conductor waveguides  
 (D) all two conductor lines
54. In a TEM mode, .....  
 (A) some components of E and H are in direction of propagation  
 (B) either E or H component is entirely transverse to the direction of propagation  
 (C) electric and magnetic fields are entirely transverse to the direction of propagation  
 (D) always at least one field component is transverse to the direction of propagation
55. In hollow single conductor waveguides .....  
 (A) always at least field component is in the direction of transmission  
 (B) components of both fields are in the direction of propagation  
 (C) components of E and H are always entirely transverse to the direction of propagation  
 (D) are the examples of transverse electromagnetic mode types
56. When  $\beta$  of a npn transistor is 49, what is the  $\alpha$  ?  
 (A) 0.98  
 (B) 0.96  
 (C) 0.90  
 (D) 0.94
57. Match the following lists and choose the *correct* answer from the codes given below :
- List I**  
(Band Gap in eV)
- (a) 0.67  
 (b) 1.1  
 (c) 1.4  
 (d) 2.4
- List II**  
(Material)
- (i) GaAs  
 (ii) Cadmium sulphide  
 (iii) Silicon  
 (iv) Germanium
- Codes :**
- (a) (b) (c) (d)  
 (A) (iv) (iii) (i) (ii)  
 (B) (iii) (ii) (i) (iv)  
 (C) (iv) (i) (iii) (ii)  
 (D) (ii) (iii) (i) (iv)

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58. Match the following lists and choose the *correct* answer from the codes given below :

**List I**

- (a) Pinch of region
- (b) Secondary breakdown
- (c) Latching current
- (d) Totem pole

**List II**

- (i) Transistor
- (ii) Thyristor
- (iii) TTL
- (iv) FET

**Codes :**

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

59. DMOSFET with  $V_{GS} = 0$  acts as a :

- (A) Power source
- (B) Voltage source
- (C) Both voltage and current source
- (D) Current source

60. The effective collector to emitter resistance in CE configuration in saturation mode for  $I_C = 20$  mA and  $V_{CE} = 0.1$  V is :

(A)  $50 \Omega$ (B)  $5 \Omega$ (C)  $500 \Omega$ (D)  $0.5 \Omega$ 

61. By controlling the point in each half cycle when SCR turns on, the SCR based control circuit achieves :

(A) high efficiency but high cost

(B) low cost but low efficiency

(C) high efficiency but increased distortion

(D) low distortion but high cost

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62. Match the following lists and choose the *correct* answer from the codes given below :

**List I**

- (a) Zener diode
- (b) Tunnel diode
- (c) Simple pn-diode
- (d) Schottky barrier diode

**List II**

- (i) Rectification
- (ii) Metal-semiconductor contact
- (iii) Negative resistance
- (iv) Breakdown

**Codes :**

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

63. A triangular wave is represented by

the equation  $f(t) = -\frac{4A}{T}t + 2A$

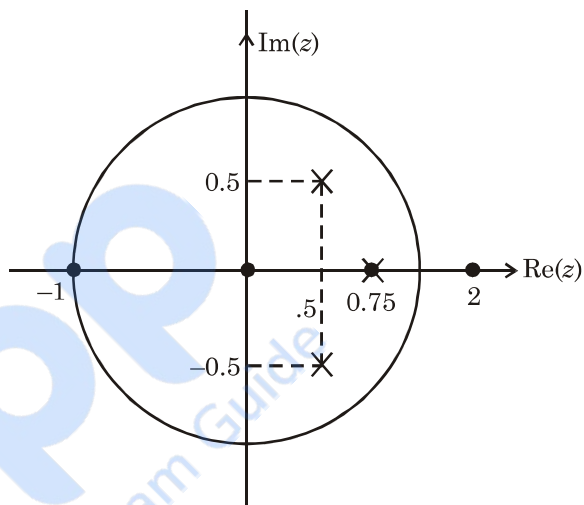
where A is amplitude and T is period. The Fourier coefficients  $a_0$ ,  $a_1$  and  $b_1$  are :

- (A) 1, 1, 1
- (B)  $0, \frac{A}{\pi}, \frac{A^2}{\pi^2}$
- (C)  $1, 0, \frac{8A}{\pi^2}$
- (D)  $0, 0, \frac{8A}{\pi^2}$

64. A pole-zero diagram is given below.

The corresponding transfer function

$H(z)$  is :



(A)  $\frac{(z-2)(z-1)}{(z+j0.5)(z-j0.5)(z-0.75)}$

(B)

(C)  $\frac{(z+0.5+j0.5)(z-0.5-j0.5)(z-1)}{(z-2)(z-0.75)}$

(D)

(A)  $\frac{z(z+1)(z-2)}{(z-0.5+j0.5)(z-0.5-j0.5)(z-0.75)}$

(D)  $\frac{z(z-1)}{(z^2+(0.5)^2)(z-0.75+0.5j)}$

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65. Correlate items from List I with those in List II :

**List I**

- (a) Fourier transform
- (b) Laplace transform
- (c)  $z$ -transform
- (d) Fourier series

**List II**

- (i) Discrete
- (ii) Parseval's theorem
- (iii) For a two-sided transform specification of ROC is essential
- (iv) Periodic functions

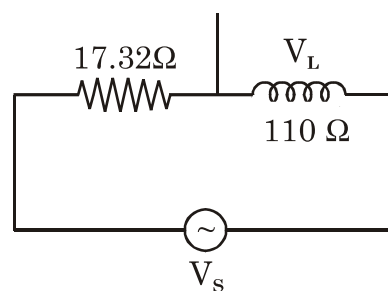
**Codes :**

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

66. The polar plot of  $P(j\omega) = 45^\circ$  as  $\omega$  varies from  $-\infty$  to  $+\infty$  is

- (A) a straight line parallel to  $x$ -axis
- (B) a straight line parallel to  $y$ -axis
- (C) a line passing through origin and inclined at  $45^\circ$
- (D) a line in first quadrant having intersection on  $x$ -axis

67. In a circuit shown the voltage  $V_S$  has a phase angle of ..... with respect to  $V_L$ .



- (A)  $120^\circ$
- (B)  $60^\circ$
- (C)  $90^\circ$
- (D)  $0^\circ$

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68. If a periodic pulse waveform has a pulse width and the time between pulses each equal to or greater than five time constants, the capacitor will :

- (A) fully charge and fully discharge during each period of the input waveform
- (B) partially charge and partially discharge during each period of the input waveform
- (C) partially charge and fully discharge during each period of input waveform
- (D) fully charge and partially discharge during each period of input waveform

69. Match List I with List II and select the *correct* answer using codes given below :

**List I**

- (a) 78XX
- (b) 741
- (c) 7404
- (d) LM317

**List II**

- (i) Variable voltage regulator
- (ii) Hex inverter
- (iii) OP-Amp
- (iv) +ve voltage regulator

**Codes :**

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

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70. Match List I with List II and select the *correct* answer using codes given below :

**List I**

- (a) Astable multivibrator
- (b) Monostable multivibrator
- (c) Bistable multivibrator
- (d) Free running multivibrator

**List II**

- (i) Two stable states
- (ii) No stable state
- (iii) One stable state
- (iv) alternate high and low O/P

**Codes :**

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

71. Match List I with List II and select the *correct* answer using codes given below :

**List I**

- (a) Virtual ground
- (b) Pinch off
- (c) Barkhausen criterion
- (d) IC 555

**List II**

- (i) JFET
- (ii) OP-Amp
- (iii) Timer
- (iv)  $-A\beta \geq 1$

**Codes :**

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

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72. Match List I with List II and select the *correct* answer using codes given below :

**List I**

- (a) Diode
- (b) Tunnel diode
- (c) Lock range
- (d) Virtual ground

**List II**

- (i) Oscillator
- (ii) Rectification
- (iii) OP-AMP
- (iv) PLL

**Codes :**

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

73. In a Wien Bridge oscillator CKT, the value of frequency can be calculated by the following formula :

(A)  $f_0 = \frac{1}{2\pi(R_1^2 + R_2^2)(C_1^2 + C_2^2)}$

(B)  $f_0 = \frac{1}{2\pi\sqrt{L_1}(C_1 + C_2)}$

(C)  $f_0 = \frac{1}{2\pi RC}$

(D)  $f_0 = \frac{1}{2\pi\sqrt{LC}}$

74. When the reverse gate voltage of JFET changes from 4.0 to 3.9 V, the drain current changes from 1.3 to 1.6 mA. Then the value of transconductance will be :

(A) 2m mho

(B) 3m mho

(C) 10m mho

(D) 1m mho

75. A FET amplifier in the common source configuration uses a load resistance of 500 k $\Omega$ . The ac drain resistance of the device is 100 k $\Omega$  and the transconductance is 0.8 mAV<sup>-1</sup>. Then the voltage gain of the amplifier will be :

(A) 100

(B) -100

(C) -66.67

(D) -50

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