Electronic Science
Paper III

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

Note : This Paper contains Seventy five (75) multiple choice questions. Each question carries Two (2) marks. Attempt *All* questions.

1. JFET is a :
   (A) Current controlled device with high I/P resistance
   (B) Voltage controlled device with high I/P resistance
   (C) Current controlled current source (CCCS)
   (D) Voltage controlled voltage source (VCVS)

2. An ideal voltage source should have :
   (A) Zero internal resistance
   (B) Infinite internal resistance
   (C) A small internal resistance
   (D) Large internal resistance

3. When by-pass capacitor across the emitter lead in CE-amplifier is disconnected, it causes :
   (A) Current gain to increase
   (B) Voltage gain to increase
   (C) Current gain to decrease
   (D) Voltage gain to decrease

4. Match the following and choose the *correct* option from the codes given below :

	Set I		**Set II**
(*a*)	FET	(*i*)	Same crystal structure as that of the substrate
(*b*)	Epitaxy	(*ii*)	VVR
(*c*)	Schmitt trigger	(*iii*)	Interconnection
(*d*)	Metallization	(*iv*)	Hysteresis

Codes :

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

[P.T.O.

5. Astable multivibrator is a multivibrator with duty cycle equal to :

(A) 50%

(B) 100%

(C) 30%

(D) 33%

6. Negative feedback in CE-amplifier is to :

(A) Increase the voltage gain

(B) Increase the current gain

(C) Increase the power-band width

(D) Decrease power band width

7. Important characteristics of an emitter follower are :

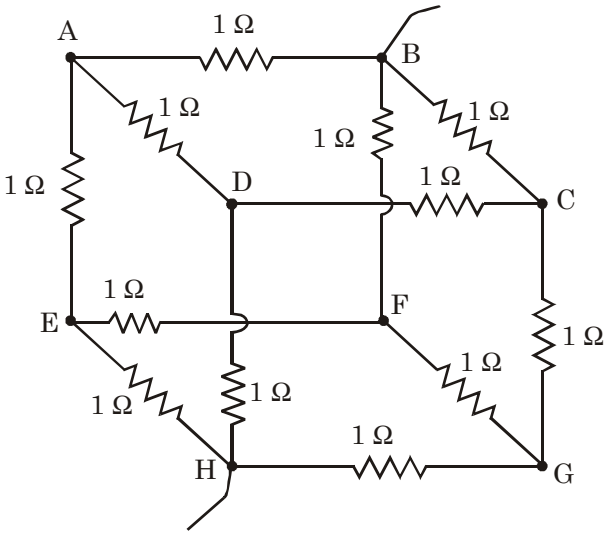
(A) High I/P impedance and high O/P impedance

(B) High I/P impedance and low O/P impedance

(C) Low I/P impedance and low O/P impedance

(D) Low I/P impedance and high O/P impedance

8. The identical resistors are connected in the following topology, where value of each resistor is 1 Ω. The effective equivalent resistance measured between Node B and Node H is .....



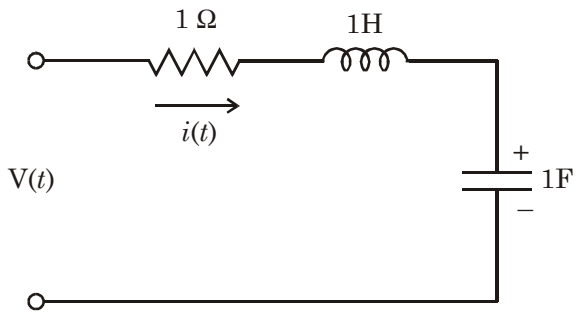
(A) 2/3 Ω

(B) 5/6 Ω

(C) 1/6 Ω

(D) 1/3 Ω

9. The circuit shown in the figure has initial current $i_L(0-) = 1A$ through the inductor and an initial voltage $V_c(0-) = -1V$ across the capacitor. For input $V(t) = u(t)$, the Laplace transform of the current $i(t)$ for $t > 0$ is :



(A) $\frac{s+2}{s^2+s+1}$

(B) $\frac{s-2}{s^2+s+1}$

(C) $\frac{s-2}{s^2+2s+1}$

(D) $\frac{s}{s^2+s+1}$

10. A series RLC circuit has a current which lags the applied voltage by 30°. The inductor voltage maximum is twice the capacitor voltage maximum, and

$$V_L = 10.0 \sin 1000\ t.$$

Given that : R = 20 Ω, L and C are respectively :

(A) L = 2.31 mH, C = 86.5 μF

(B) L = 23.1 mH, C = 86.5 μF

(C) L = 23.1 mH, C = 8.65 μF

(D) L = 23.1 μH, C = 86.5 nF

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

	List I		**List II**
(*a*)	Incidence matrix	(1)	Links
(*b*)	Cutset matrix	(2)	Twigs
(*c*)	Tie set matrix	(3)	Nodes
(*d*)	Reduced incidence matrix	(4)	Branch

Codes :

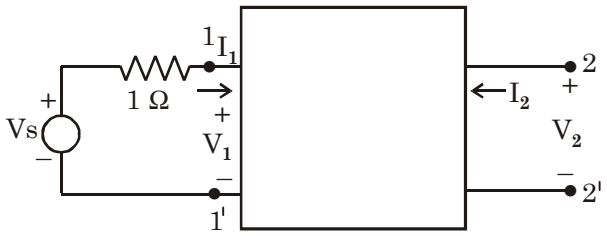
(A) (*a*)—(3), (*b*)—(1), (*c*)—(2), (*d*)—(4)

(B) (*a*)—(3), (*b*)—(2), (*c*)—(1), (*d*)—(3)

(C) (*a*)—(1), (*b*)—(2), (*c*)—(3), (*d*)—(4)

(D) (*a*)—(2), (*b*)—(1), (*c*)—(3), (*d*)—(4)

12. The Y-parameters of the two-port network shown in the following figure are $Y_{11} = Y_{22} = 6$ mho, $Y_{12} = Y_{21} = 4$ mho. The driving point admittance at port 2-2', if the source voltage is 100 V with an impedance of 1 Ω is :



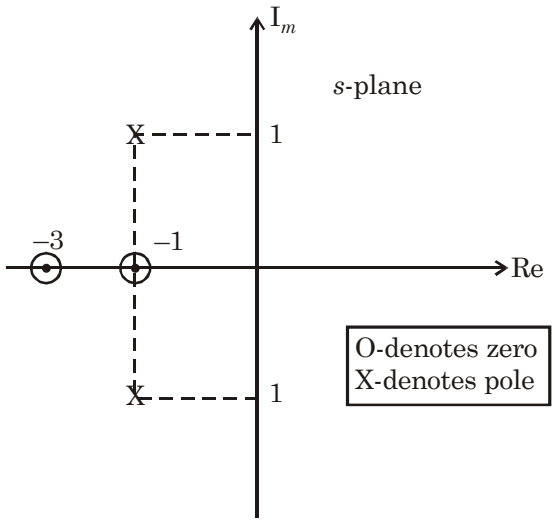
(A) $\frac{1}{3.714}$ mho

(B) 3.714 mho

(C) 0.3714 mho

(D) $\frac{1}{0.3714}$ mho

13. The driving point impedance Z(s) of a network has the pole-zero locations as shown in the figure. If $z(0) = 3$, then $z(s)$ is :



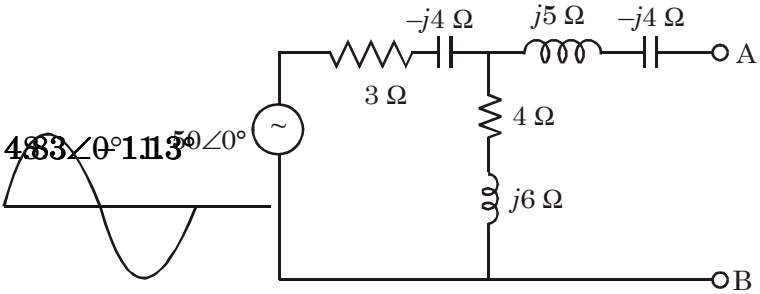
(A) $\frac{3(s+3)}{s^2+2s+3}$

(B) $\frac{2(s+3)}{s^2+2s+2}$

(C) $\frac{3(s-3)}{s^2-2s-2}$

(D) $\frac{2(s-3)}{s^2-2s-3}$

14. For the circuit shown in figure, the Thevenin's equivalent impedance between the output terminals is :



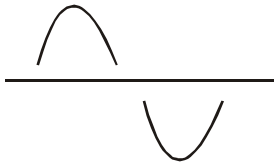
(A)

(B)

(C)

(D)

15. Match the following. Figures show the conduction region for different amplifiers for the input and choose the *correct* answer from the codes given below :

(*p*)		(1) Class B
(*q*)		(2) Class C
(*r*)		(3) Class AB
(*s*)		(4) Class A

Codes :

(A) (*p*)—(4), (*q*)—(2), (*r*)—(3), (*s*)—(1)

(B) (*p*)—(1), (*q*)—(2), (*r*)—(4), (*s*)—(3)

(C) (*p*)—(4), (*q*)—(3), (*r*)—(1), (*s*)—(2)

(D) (*p*)—(4), (*q*)—(1), (*r*)—(2), (*s*)—(3)

16. Product of gain and bandwidth is constant when the roll-off is :

(A) – 10 dB/decade

(B) – 20 dB/decade

(C) – 30 dB/decade

(D) + 10 dB/decade

17. In a two-stage amplifier one stage has a lower critical frequency of 850 Hz and an upper critical frequency of 100 kHz. The other has correspondingly 1 kHz and 230 kHz critical frequencies. The overall bandwidth is :

(A) 99 kHz

(B) 229.15 kHz

(C) 99.15 kHz

(D) 229 kHz

18. A varactor diode exhibits :

(A) A variable capacitance that depends on reverse voltage

(B) A variable resistance that depends on reverse voltage

(C) A variable capacitance that depends on forward current

(D) A constant capacitance over a range of reverse voltages

19. A Gyrator is a circuit using OP Amps, that simulates :

(A) Inductance property with the help of resistors and capacitors

(B) Resistance property with the help of inductance and capacitors

(C) Capacitance property with the help of resistance and inductances

(D) The circuit does not use any of the components

20. The electrothermal filters are used in the :

(A) less than 1 Hz to audio range

(B) 50 Hz to 100 kHz range

(C) 100 kHz to 1 MHz range

(D) 90 MHz to 100 MHz range

21. The principle of MODEMs is :

(A) FSK

(B) PWM

(C) Phase adder

(D) Automatic fine tuning

22. What is the meaning of RAM and what is its primary role ?

(A) Readily available memory, it is memory that can be reached by any sub-item within a computer and at any time

(B) Random access memory, it is memory used for short term temporary data storage within the computer

(C) Random access memory, it is the first level of memory used by the computer in all of its operations

(D) Resettable automatic memory, it is the memory that can be used and then automatically reset, or cleared, after being read from or written to

23. A BCD counter is a .....

(A) Binary counter

(B) Full-modulus counter

(C) Decade counter

(D) Johnson counter

24. Consider the following series of TTL :

(*i*) 74

(*ii*) 74H

(*iii*) 74L

(*iv*) 74S

Write them in increasing order of power dissipation per gate :

(A)	(*iii*)	(*i*)	(*iv*)	(*ii*)
(B)	(*i*)	(*ii*)	(*iii*)	(*iv*)
(C)	(*iv*)	(*i*)	(*ii*)	(*iii*)
(D)	(*ii*)	(*iii*)	(*iv*)	(*i*)

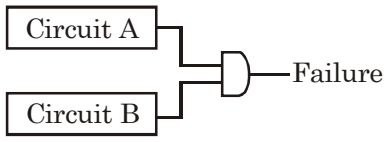
25. Match List I with List II and select the answer using the codes given below :

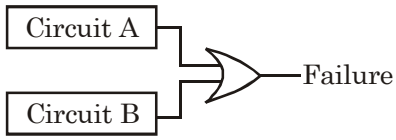
	List I		**List II**
(*a*)	Schmitt trigger	(*i*)	Toggle switch
(*b*)	J-K flip-flop	(*ii*)	Delay switch
(*c*)	D flip-flop	(*iii*)	Race around condition
(*d*)	T flip-flop	(*iv*)	Comparator and square wave generator

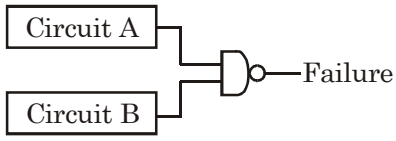
Codes :

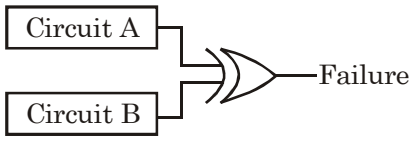
	(*a*)	(*b*)	(*c*)	(*d*)
(A)	(*iv*)	(*iii*)	(*ii*)	(*i*)
(B)	(*i*)	(*ii*)	(*iii*)	(*iv*)
(C)	(*ii*)	(*i*)	(*iv*)	(*iii*)
(D)	(*iii*)	(*i*)	(*iv*)	(*ii*)

26. A certain system contains two identical circuits operating in parallel. As long as both are operating properly, the outputs of both circuits are always the same. A failure in one of the circuits produce differing outputs. One of the following logic circuits is the best alternative to detect the fault :

(A)


(B)


(C)


(D)


Direction : Read the following paragraph and answer the Question Nos. **27** and **28** based on the same.

"Many DACs use a BCD input code where 4-bit code groups are used for each decimal digit. In one such 12-bit BCD digital to analog converter the full scale output is 9.99 V."

27. The percent resolution of above referred DAC will be :

(A) 0.001%

(B) 0.01%

(C) 0.1%

(D) 1.0%

28. The step size of the above referred DAC is :

(A) 0.001 V

(B) 0.01 V

(C) 0.1 V

(D) 1.0 V

29. Match List I (Logic family) with List II (Typical fanout) and select the answer using the codes given below :

	List I		**List II**
(*a*)	RTL	(*i*)	> 50
(*b*)	TTL	(*ii*)	5
(*c*)	ECL	(*iii*)	10
(*d*)	CMOS	(*iv*)	25

Codes :

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

Direction : Read the following paragraph regarding the 8085 assembly language program :

"The main program is stored at $(0100)_H$. The main program has called the subroutine at $(0150)_H$, when the microprocessor is executing the instruction at location $(0151)_H$. The program listing is as follows."

0100	LXI SP, 0400H
0103	EI
0120	CALL 0150 H
0130	HLT
0150	PUSH B
0151	LXI B, 10 FFH
0154	MOV C, A
015E	POP B
015F	RET

Direction : Answer the Question Nos. **30, 31** and **32** based on the above Scenario.

30. Assuming that before CALL 0150 H, the stack was not used, specify the content of top two locations of the stack :

(A) 23H, 01H

(B) 23H, 00H

(C) FFH, 00H

(D) 00H, FFH

31. Specify the stack locations where the contents of register pair B are stored :

(A) 03FDH and 03FCH

(B) 03FDH and 03FEH

(C) 03FEH and 03FFH

(D) 03FBH and 03FCH

32. When the program was interrupted, what is the memory address stored on the stack ?

(A) FFFFH

(B) 015FH

(C) 0154H

(D) 0150H

33. In interfacing 16 keys and 8 relays directly using 8255 IC with 8085 microprocessor the minimum number of pins of 8255 required are :

(A) 4 inputs, 4 outputs, 8 outputs

(B) 4 inputs, 8 outputs, 8 I/Os

(C) 8 I/O only

(D) 12 I/O only

34. By using 8279 IC with 8085 the following functions can be done :

(A) Relay interfacing

(B) stepper motor interfacing

(C) Display interfacing only (LCD/ LED)

(D) Display (7 segment) interfacing and keyboard interfacing

35. Timer ports of 8051 microcontroller can be used for :

(A) Generation of waveforms

(B) Generation of PWM

(C) Measurement of time (ON, OFF and Freq.) of input signal with gate control

(D) As a counter and (B) and (C) above

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

Ports of 8051		Application	
(*i*)	Port 0	(*a*)	I/O + control
(*ii*)	Port 1	(*b*)	I/O + higher order address bus
(*iii*)	Port 2	(*c*)	Low address & data bus
(*iv*)	Port 3	(*d*)	I/O port only
		(*e*)	Timer port + Input only

Codes :

(A) (*i*)—(*c*), (*ii*)—(*d*), (*iii*)—(*b*), (*iv*)—(*a*)

(B) (*i*)—(*d*), (*ii*)—(*b*), (*iii*)—(*a*), (*iv*)—(*e*)

(C) (*i*)—(*e*), (*ii*)—(*a*), (*iii*)—(*b*), (*iv*)—(*c*)

(D) (*i*)—(*a*), (*ii*)—(*b*), (*iii*)—(*c*), (*iv*)—(*d*)

37. The structure variables can be passed to the function as a :

(A) Copy of the structure variable

(B) Pointer to a structure variable

(C) Both (A) and (B) depending on speed of operations required

(D) Both (A) and (B)

38. After execution of the following statement :

X = (int *) Malloc(100);

(assume size of int as 2 bytes)

The following amount of memory for execution will be allotted :

(A) 2 bytes

(B) 100 bytes

(C) 200 bytes

(D) 4 bytes

39. The output of the following program :

```
void main (void)
{
    unsigned char flag=0X00;
    flag!=(1<< 7)
    printf("%d", flag);
```

(A) 0X00

(B) 0X70

(C) 0X80

(D) 0XFF

40. Consider the following statement

fprintf(outfile, "programming in C is fun.\n");

The "out file" in this statement is :

(A) name of a variable to be printed

(B) file pointer previously declared and defined by fopen

(C) identifier representing the file name

(D) pointer of the variable to be printed

41. **(A) Assertion :** Various objects can be drawn on the computer screen with proper scale factors and colour selection

because :

(R) Reason : Matching band rate is a must for connecting a mouse to serial port.

(A) Both (A) and (R) are true statements and the reason is a correct explanation of assertion

(B) Both (A) and (R) are true statements but the reason is not a correct explanation of assertion

(C) The (A) is true but (R) is false

(D) The (A) is false but (R) is true

42. What will be the output of the following program ?

```
#include <stdio.h>
int abc(int u, int v)
{
    int tmp;
 while (v !=0) {
    tmp=u%v;
    u=v;
    v=tmp
    }
 return u;
}
int main(void)
{
    int result;
    result=abc(150, 35);
    printf("result=%d", result);
return 0;
}
```

(A) 35

(B) 4

(C) 10

(D) 5

43. A uniformly charged sphere is compressed slightly on opposite sides. It will exhibit a :

(A) Monopole

(B) Monpole + dipole

(C) quadrupole

(D) monopole + qaudrupole

44. Given that the time variation of electric and magnetic fields is $e^{j\omega t}$, match the following and choose the *correct* option given below : :

(*p*)	$\vec{\nabla} \times \vec{E}$	(1)	0
(*q*)	$\vec{\nabla} \times \vec{H}$	(2)	$-j\omega\mu \vec{H}$
(*r*)	$\vec{\nabla} . \vec{D}$	(3)	P_v
(*s*)	$\vec{\nabla} . \vec{B}$	(4)	$(\sigma + j\omega \in)\vec{E}$

Options are :

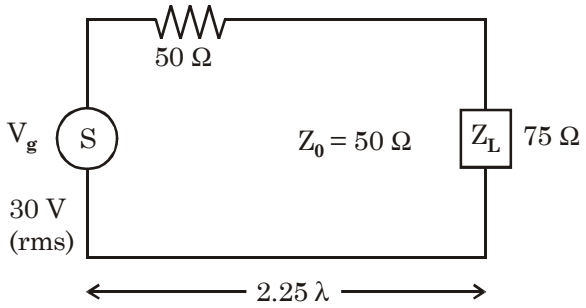
(A) (*p*)—(3), (*q*)—(1), (*r*)—(2), (*s*)—(4)

(B) (*p*)—(4), (*q*)—(2), (*r*)—(1), (*s*)—(3)

(C) (*p*)—(4), (*q*)—(3), (*r*)—(1), (*s*)—(2)

(D) (*p*)—(2), (*q*)—(4), (*r*)—(3), (*s*)—(1)

Directions : Given the transmission line below, obtain the following quantities, for Question Nos. **45, 46** and **47**.



45. The input impedance is :

(A) 66.66 Ω

(B) 33.33 Ω

(C) 50 Ω

(D) 75 Ω

46. The reflection coefficient is :

(A) 1

(B) 0

(C) 0.2

(D) 0.5

47. Instantaneous power delivered to the load :

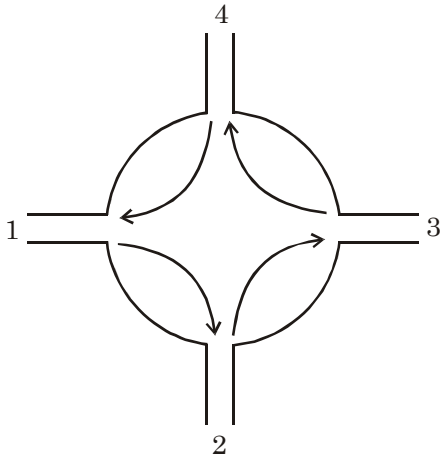
(A) 17.28 W

(B) 16 W

(C) 18.39 W

(D) 36 W

48. A circulator with direction of flow of power is shown in the figure.



Corresponding S matrix is :

(A)

(B) $\begin{bmatrix} 0 & 0 & 0 & 1 \\ 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \end{bmatrix}$

(C) $\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$

(D) $\begin{bmatrix} 0 & 1 & 0 & 0 \\ 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$

49. An incident wave has amplitude 1V. Corresponding reflected one is $\frac{1}{3}$ V. The VSWR is :

(A) 3

(B) 2

(C) 1

(D) $\frac{1}{2}$

The tuned circuit of the oscillator in a simple AM transmitter uses a 40 μH coil and 12 nF capacitor. If the oscillator output is modulated by audio frequency of 5 kHz. Answer questions 50 and 51 based on the above information.

50. Calculate the lower side band frequency :

(A) 224 kHz

(B) 228 kHz

(C) 442 kHz

(D) 19 kHz

51. The bandwidth needed to transmit this amplitude modulated wave is :

(A) 5 kHz

(B) 2 kHz

(C) 10 kHz

(D) 7 kHz

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

	Column I		Column II
(*a*)	Amplitude Modulator	(*i*)	Frequency Discriminator
(*b*)	DSBSC modulator	(*ii*)	Ring modulator
(*c*)	SSB modulator	(*iii*)	Switching modulator
(*d*)	VSB modulator	(*iv*)	Phase discrimination method

Codes :

(A) (A)—(3), (B)—(2), (C)—(1), (D)—(4)

(B) (A)—(2), (B)—(3), (C)—(4), (D)—(1)

(C) (A)—(3), (B)—(1), (C)—(2), (D)—(4)

(D) (A)—(2), (B)—(4), (C)—(3), (D)—(1)

53. When input signal strength = 0.5 W, maximum frequency deviation = 60 kHz, base band signal cutoff frequency = 15 kHz, received white Gaussian noise power spectral density = 10^{-9} W/Hz and the average power of modulating signal = 0.1 W, the SNR of an FM limiter-discriminator demodulator is .....

(A) 36.08 dB

(B) 26.07 dB

(C) 46.07 dB

(D) 30 dB

54. **(A) Assertion :** Use of a compressor improves the signal to quantization noise ratio of a PCM system because :

(R) Reason : The compressor provides lower gain to weak signals and higher gain to the strong signals.

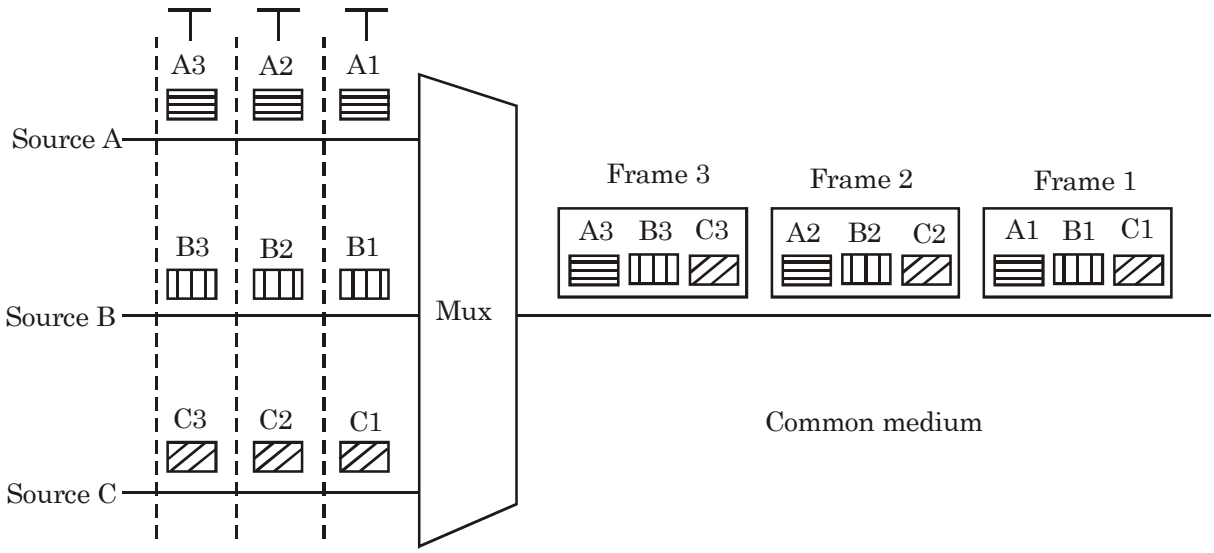
(A) Both (A) and (R) are true statements and the reason is correct explanation of the assertion

(B) Both (A) and (R) are true statements and the reason is not correct explanation of the assertion

(C) The (A) is true but (R) is false

(D) The (A) is false but (R) is true

55.



The above diagram represents a :

(A) FDM system

(B) TDM system

(C) WDM system

(D) PCM system

56. For a polar NRZ signal representing 1 by a positive pulse X_1 and 0 by a negative pulse X_2 of duration T, the impulse response of a matched filter is given by :

(A) $h(t) = X_1(T - t) + X_2(T - t)$

(B) $h(t) = X_1(t) + X_2(t)$

(C) $h(t) = X_1(T - t) - X_2(T - t)$

(D) $h(t) = X_1(t) - X_2(t)$

57. The *correct* relationship from among the following is :

(A) BW (ASK) > BW (FSK)

(B) BW (BPSK) > BW (QPSK)

(C) Noise immunity of QPSK < Noise immunity of BFSK

(D) Noise immunity of ASK > = Noise immunity of PSK

58. A thyristor of thermal resistance 1.8°C/W is mounted on a neat sink of thermal resistance 2.0°C/W. What is the maximum power loss of thyristor if the junction temperature is not to exceed 125°C in an ambient of 40°C.

(A) 5.2 W

(B) 11.4 W

(C) 18.6 W

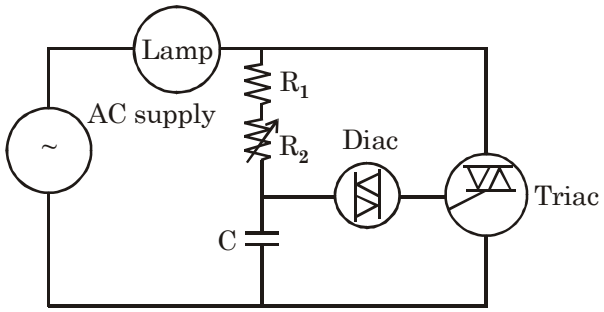
(D) 22.4 W

59. You need a very efficient device to control the speed of AC fan motor. An appropriate device for the same would be :

(A) SCR (B) Triac

(C) UJT (D) PUT

60. The following is the circuitary for a dimmer :



What method of power control is used ?

(A) Phase control

(B) Feedback control

(C) Proportional control

(D) Burst firing

61. **Assertion (A) :** Optical communication is called information super highway.

Reason (R) : Optical pulses travel at higher speed as compared to copper cable.

(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 correct explanation of (A)

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

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

62. Match List I with List II and choose the *correct* answer from the codes given below :

	List I		**List II**
(*a*)	Single mode fiber	(*i*)	Local area network
(*b*)	Step index multimode fiber	(*ii*)	Low cost application
(*c*)	Graded index fiber	(*iii*)	Low bandwidth
(*d*)	PCS fibers	(*iv*)	High bandwidth

Codes :

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

63. Match List I with List II and choose the *correct* answer from the codes given below :

	List I		**List II**
(*a*)	Fusion splicing	(*i*)	Low cost
(*b*)	3 pin splicing	(*ii*)	Multimode
(*c*)	Plastic 'V' grove splicing	(*iii*)	Low insertion loss
(*d*)	Square tube splicing	(*iv*)	Graded index fibers

Codes :

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

64. The following display device is *not* suitable for high frame rate display :

(A) CRT

(B) LCD

(C) LED

(D) PDP

65. Consider the following light sources. Give their suitability in the order of merit for optical communication in fibers :

(*a*) LED

(*b*) Ruby laser

(*c*) Febry Perrot laser diode

(*d*) DFB laser

(A) (*b*), (*a*), (*c*), (*d*)

(B) (*a*), (*c*), (*b*), (*d*)

(C) (*c*), (*a*), (*d*), (*b*)

(D) (*d*), (*a*), (*b*), (*c*)

66. The most common type of vibration sensors are :

(A) Piezoelectric

(B) Capacitive

(C) Resistive

(D) (A) and (B) both

67. The magnetic flow meter has the following disadvantages :

(A) Suitable for high and low velocities

(B) Suitable for conductivity greater than 20 mho/cm

(C) Gives slow response to flow changes

(D) Very low cost and require minimum maintenance

68. Match the following and choose the correct answer from the codes given below :

	Transducer		**Principle**
(*i*)	Photovoltaic	(*a*)	An emf is generated across the junction of two dissimilar metals when two ends are at different temperatures
(*ii*)	Moving coil generator	(*b*)	Motion of a coil in a magnetic field generates a voltage
(*iii*)	Piezoelectric pickup	(*c*)	An emf is generated due to external force on quartz
(*iv*)	Thermocouple	(*d*)	A voltage is generated in a semiconductor junction device due to radiant energy
(*v*)	Thermistor		

Codes :

(A) (*i*)—(*d*), (*ii*)—(*b*), (*iii*)—(*c*), (*iv*)—(*a*)

(B) (*i*)—(*a*), (*ii*)—(*d*), (*iii*)—(*b*), (*iv*)—(*c*)

(C) (*i*)—(*b*), (*ii*)—(*c*), (*iii*)—(*d*), (*iv*)—(*a*)

(D) (*i*)—(*c*), (*ii*)—(*a*), (*iii*)—(*b*), (*iv*)—(*d*)

69. Match the following and choose the correct answer from the codes given below :

Measurement Quantity		**Measuring Unit/Symbol**	
(*i*)	Phase angle	(*a*)	Pa or N/m^2
(*ii*)	Angular velocity	(*b*)	kg/m
(*iii*)	Linear denstiy	(*c*)	rad/s
(*iv*)	Stress	(*d*)	Radian
		(*e*)	kg/m^3

Codes :

(A) (*i*)—(*d*), (*ii*)—(*b*), (*iii*)—(*a*), (*iv*)—(*c*)

(B) (*i*)—(*e*), (*ii*)—(*a*), (*iii*)—(*c*), (*iv*)—(*b*)

(C) (*i*)—(*a*), (*ii*)—(*b*), (*iii*)—(*c*), (*iv*)—(*e*)

(D) (*i*)—(*d*), (*ii*)—(*c*), (*iii*)—(*b*), (*iv*)—(*a*)

70. The resistors in a bridge are given by $R_1 = R_2 = R_3 = 120\ \Omega$ and $R_4 = 121\ \Omega$. If supply voltage is 10.0 V dc, then the offset voltage will be :

(A) + 20.7 mV

(B) – 20.7 mV

(C) 0.0 mV

(D) 1.0 mV

71. In a PID control system, the control equation will be :

(A) V_{out} = KP * (DE) + PI * PD

(B) V_{out} = KP * (DE) + PI + PD

(C) V_{out} = KP * [DE + PI + PD]

(D) V_{out} = [KP * (DE)/PI] * PD

72. Match the following and select the *correct* answer from the codes given below :

(*i*)	Bode plot	(*a*)	Stability of linear control system
(*ii*)	Root locus plot	(*b*)	Stability in frequency response
(*iii*)	Nyquist criterion & Nicholas chart	(*c*)	Analysis of frequency response
(*iv*)	Hurwitz and Routh criterion	(*d*)	Method to determine the roots of a characteristic equation
		(*e*)	Compensation and control of close loop system

Codes :

(A) (*i*)—(*d*), (*ii*)—(*b*), (*iii*)—(*c*), (*iv*)—(*a*)

(B) (*i*)—(*a*), (*ii*)—(*b*), (*iii*)—(*c*), (*iv*)—(*d*)

(C) (*i*)—(*a*), (*ii*)—(*b*), (*iii*)—(*c*), (*iv*)—(*e*)

(D) (*i*)—(*c*), (*ii*)—(*d*), (*iii*)—(*b*), (*iv*)—(*a*)

73. The system described by $\frac{dx}{dt} = f(x)$ is :

(A) an autonomous system

(B) a static system

(C) a time dependent system

(D) a non-linear system

74. The characteristic equation of a system is given by :

$s^6 + 3s^5 + 8s^4 + 18s^3 + 37s^2 + 75s + 50 = 0$

The system is :

(A) Stable

(B) Unstable

(C) Marginally stable

(D) Conditionally stable

75. The open loop transfer function of a feedback system is :

$$G(s)\ H(s) = \frac{k(1+s)}{(1-s)}$$

The value of k for which the system is stable, is :

(A) $k < 1$

(B) $k > 1$

(C) $k = 1$

(D) $k = 0$

ROUGH WORK

ROUGH WORK

Test Booklet No.
प्रश्नपत्रिका क्र.

M

Paper-III
ELECTRONIC SCIENCE

Signature and Name of Invigilator

1. (Signature) .....

(Name) .....

2. (Signature) .....

(Name) .....

Seat No. | | | | | | |

(In figures as in Admit Card)

Seat No. .....

(In words)

OMR Sheet No. | | | | | | |

(To be filled by the Candidate)

FEB - 38313

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

1. Write your Seat No. and OMR Sheet No. in the space provided on the top of this page.
2. 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).
3. 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 :
   (*i*) To have access to the Question Booklet, tear off the paper seal on the edge of this cover page. Do not accept a booklet without sticker-seal 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 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.**
   (*iii*) After this verification is over, the OMR Sheet Number should be entered on this Test Booklet.
4. 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) ● (D)

5. 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.
6. Read instructions given inside carefully.
7. Rough Work is to be done at the end of this booklet.
8. 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.
9. 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.
10. **Use only Blue/Black Ball point pen.**
11. **Use of any calculator or log table, etc., is prohibited.**
12. **There is no negative marking for incorrect answers.**

विद्यार्थ्यांसाठी महत्त्वाच्या सूचना

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

   (A) (B) ● (D)

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