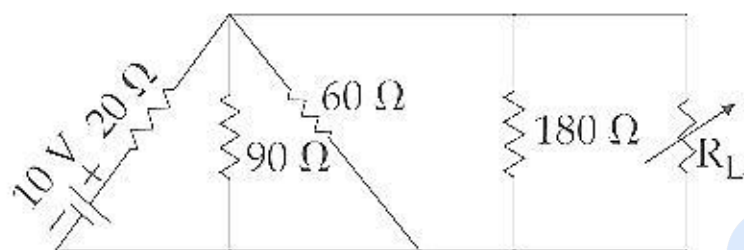


UGC NET PAPER 2 NOVEMBER 05, 2017 SHIFT 1 ELECTRONIC SCIENCE QUESTION PAPER

Note : This paper contains fifty (50) objective type questions of two (2) marks each. All questions are compulsory.

1. The depletion region in a junction diode contains charges that are :
- (1) Mobile donor and acceptor ion (2) Fixed donor and acceptor ion
 (3) Mostly majority carriers (4) Mostly minority carriers

2. For the circuit shown below, the value of R_L and maximum power are :



- (1) $6\ \Omega$ and $0.51\ W$ (2) $12\ \Omega$ and $0.6\ W$
 (3) $12\ \Omega$ and $0.75\ W$ (4) cannot be calculated without knowing R_L
3. In a full wave rectifier, the current in each of the diode flows for :
- (1) Half cycle of input signal (2) Full cycle of input signal
 (3) Quarter cycle of input signal (4) Three fourth cycle of input signal

4. The Boolean SOP expression obtained from the truth table is :

| Inputs | | | Output |
|--------|---|---|--------|
| A | B | C | X |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 1 | 1 |
| 0 | 1 | 0 | 0 |
| 0 | 1 | 1 | 0 |
| 1 | 0 | 0 | 0 |
| 1 | 0 | 1 | 0 |
| 1 | 1 | 0 | 1 |
| 1 | 1 | 1 | 0 |

- (1) $ABC' + A'BC$ (2) $AB'C + ABC'$ (3) $A'B'C + ABC'$ (4) $A'BC' + AB'C$

5. Which command word of 8251 indicates enter hunt mode ?
(1) D_0 (2) D_1 (3) D_6 (4) EH or D_7
6. Consider the 'C' statement printf ("%f", (float) 7/5); It prints :
(1) 1.0 (2) 1.4
(3) 2.0 (4) None of the above
7. The induction and radiation fields of an oscillating dipole becomes approximately equal at a distance 'R'. The value of 'R' is :
(1) $\lambda/6$ (2) $\lambda/4$ (3) $\lambda/3$ (4) $\lambda/2$
8. The ability of a receiver to discriminate against the interfering signals is known as :
(1) Selectivity (2) Sensitivity (3) Fidelity (4) Distortion
9. An LED made of GaAs operates at a wavelength of $0.86 \mu\text{m}$. The surrounding medium is air. The relative permittivity of GaAs is 12.9. The external quantum efficiency of the LED is :
(1) 2.31 % (2) 23.1 % (3) 13.1 % (4) 1.31 %
10. Sensitivity of potentiometer can be increased by :
(1) Decreasing the length of potentiometer wire
(2) Increasing the length of potentiometer wire
(3) Decreasing the current in potentiometer wire
(4) Decreasing the resistance in the rheostat in the series with the battery
11. The operation of JFET involves mainly :
(a) Flow of Minority carriers
(b) Flow of Majority carriers
(c) A very high input impedance
(d) Negative resistance
- Which of the following is correct ?
(1) (b) and (c) (2) (a) and (b) (3) (c) and (d) (4) (c) and (a)

12. Consider the following statements :

- (a) Tellegen's theorem is applicable to any lumped networks
- (b) The reciprocity theorem is applicable to linear bilateral networks
- (c) Thevenin's theorem is applicable to two - terminal linear active networks
- (d) Norton's theorem is applicable to two - terminal linear active networks

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

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

13. The addition of two binary variables A and B results into a SUM and a CARRY output. Consider the following expressions for SUM and CARRY outputs.

- (a) $SUM = A \cdot B + \overline{A} \overline{B}$
- (b) $SUM = A \cdot \overline{B} + \overline{A} \cdot B$
- (c) $CARRY = A \cdot B$
- (d) $CARRY = A + B$

Which of the following expressions are **correct** ?

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

14. What are the names of 16 - bit registers in 8085 ?

- (a) SP
- (b) PC
- (c) Accumulator
- (d) W

Options :

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

15. Consider the following 'C' Program :

```
# include <stdio.h>
int main ()
{
int max;
scanf ("%d", & max);
int a[max];
for (i=1; i<max; i++)
{
scanf ("%d", a[i]);
printf("%d \n", a[i]);
}
return 0;
}
```

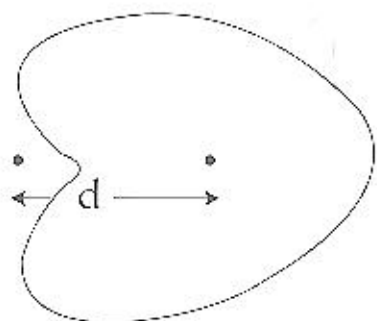
Which of the following statements are correct : about the 'C' program given above ?

- (a) The code is correct and runs successfully
- (b) The code is erroneous since the statement declaring array is invalid
- (c) The code is erroneous since the subscript for array used in 'for' loop is in the range 1 to max - 1
- (d) The code is erroneous since the type declaration statement `int a [max];` is done after `scanf()`

Options :

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

16. The radiation pattern of two non - directional radiators fed with equal currents (with a phase shift) shown in figure belongs to :



- (a) $d = \lambda/2$ (b) $\alpha = -90^\circ$ (c) $d = \lambda/4$ (d) $\alpha = 0^\circ$
- (1) (a) and (b) are correct (2) (b) and (c) are correct
- (3) (c) and (d) are correct (4) (a) and (d) are correct

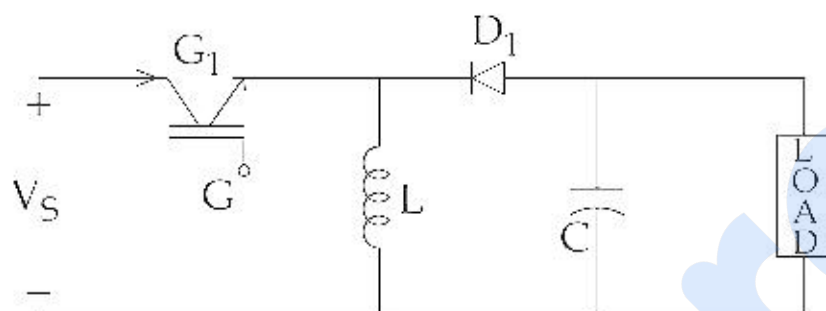
17. An FM detector produces a peak - to - peak output voltage of 1.2 V from an FM signal that is modulated to 10 kHz deviation by a sine wave.

- (a) The peak voltage is 0.6V
- (b) The detector sensitivity is $6 \mu\text{V}/\text{Hz}$
- (c) The peak voltage is 2.4V
- (d) The detector sensitivity is $60 \mu\text{V}/\text{Hz}$

Which of the above are **correct** ?

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

18. In the following circuit of buck - boost regulator :



Input voltage = 12V, duty cycle = 0.25 and switching frequency = 25 kHz , $L = 125 \mu\text{H}$ and $C = 220 \mu\text{F}$. The average load current = 1.25A. Following statements are given :

- (a) Average output voltage = 4.8 V
- (b) Peak to peak output ripple voltage = 5.68 V
- (c) Average output voltage = -4 V
- (d) Peak to peak output ripple voltage = 56.8 mV

Which one is **correct** option :

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

19. Consider the following statements regarding the steady - state error due to a step function input.

- (a) Type '0' system $e_{ss} = \frac{R}{1 + K_p}$
- (b) Type '0' system $e_{ss} = 0$
- (c) Type '1' system $e_{ss} = 0$
- (d) Type '1' system $e_{ss} = \infty$

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

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

20. The Q point of a voltage amplifier is selected in the middle of the active region because :

- (a) In this case it requires a small dc voltage
- (b) The operating point becomes stable
- (c) It gives distortion less output
- (d) It is suitable for small input signals without distorted output

Which of the following is correct ?

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

21. Match the following list :

List - I

- (a) Resist on UV exposure undergoes cross-linking
- (b) Resist on UV exposure undergoes decomposition reaction
- (c) Space charge width at zero bias for M-S contact
- (d) Law of mass action

List - II

- (i) +ve resist
- (ii) -ve photoresist
- (iii) $n.p = n_i^2$
- (iv) $\left[\frac{2\epsilon_s V_{bi}}{qN_D} \right]^{1/2}$

Correct code are :

Code :

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

22. Match the following list :

| List-I | List-II |
|--------------------------------|--------------------------|
| (a) $a \oplus b = 0$ | (i) $a \neq b$ |
| (b) $\overline{a + b} = 0$ | (ii) $a = b$ |
| (c) $\overline{a} \cdot b = 0$ | (iii) $a = 1$ or $b = 1$ |
| (d) $a \oplus b = 1$ | (iv) $a = 1$ or $b = 0$ |

Correct code are :

Code :

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

23. Match the following list :

| List-I | List-II |
|---|--|
| (a) In half wave Rectifier dc voltage across load approximately for ($r_d \ll R_L$) | (i) $\frac{V_m}{\pi}$ |
| (b) Rectification efficiency of full wave rectifier in % is | (ii) $\beta = \frac{1}{29}$ |
| (c) Gain of amplifier in dB | (iii) $\frac{81.2}{1 + \frac{r_d}{R_L}}$ |
| (d) Feedback factor when RC network is phase shift oscillator gives exactly 180° phase shift | (iv) $20 \log_{10} \frac{V_2}{V_1}$ |

Correct code are :

Code :

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

24. Match the following list :

| List-I | | List-II | |
|---------|----|-----------|----|
| (Octal) | | (Decimal) | |
| (a) | 35 | (i) | 53 |
| (b) | 65 | (ii) | 62 |
| (c) | 54 | (iii) | 29 |
| (d) | 76 | (iv) | 44 |

Correct code are :

Code :

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

25. Match the following list :

| List-I | | List-II | |
|--------------------|---------------|-------------------|-------------------|
| (8085 Instruction) | | (Addressing mode) | |
| (a) | LXI H, 3400 H | (i) | Direct |
| (b) | STA 3600 H | (ii) | Register Indirect |
| (c) | STA X B | (iii) | Immediate |
| (d) | ADD B | (iv) | Register |

Correct code are :

Code :

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

26. Match the following list :

| List-I | List-II |
|---------------|-----------------------|
| (a) DIMENSION | (i) Operator |
| (b) enum | (ii) Macro |
| (c) new | (iii) Data type |
| (d) # define | (iv) Non - executable |

Correct code are :

Code :

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

27. Match the following lists in terms of directivity of the antennas :

| List-I | List-II |
|--------------------------|------------|
| (a) Short dipole | (i) 1.64 |
| (b) $\lambda/4$ Monopole | (ii) 6.8 |
| (c) $\lambda/2$ Monopole | (iii) 3.28 |
| (d) $\lambda/2$ dipole | (iv) 1.5 |

Correct code are :

Code :

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

28. Match the following list :

| List-I (Codes) | List-II (No. of Bits used) |
|-------------------|-------------------------------|
| (a) Baudot code | (i) 7 bits |
| (b) ASCII code | (ii) 5 bits |
| (c) EBCDIC code | (iii) 10 digits |
| (d) Code 39 | (iv) 8 bits |

Correct code are :

Code :

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

29. Match the following list :

| List-I | List-II |
|-------------------------------|--|
| (a) Crest factor | (i) $\sqrt{\frac{I_s^2 - I_{s1}^2}{I_{s1}^2}}$ |
| (b) Harmonic factor | (ii) $\cos \phi$ |
| (c) Displacement power factor | (iii) $\frac{\Delta V_o}{V_o \text{ average}}$ |
| (d) Power factor | (iv) $\frac{I_s \text{ (Peak)}}{I_s}$ |

Correct code are :

Code :

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

30. Match the following list :

| List-I | List-II |
|-------------------|--------------------------------|
| (a) Amplidyne | (i) Three axes device |
| (b) Resolver | (ii) Dynamo-electric amplifier |
| (c) Gyroscope | (iii) Rotatory transformer |
| (d) Accelerometer | (iv) Inertial measurement |

Correct code are :

Code :

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

Directions : Question No. 36 to 45 :

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 code 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

36. Assertion (A) : Tunnel diode characteristics have negative resistance region.

Reason (R) : Tunnel diode can be used as rectifier.

37. Assertion (A) : Q factor of a series resonant circuit is $\frac{1}{R} \sqrt{\frac{L}{C}}$

Reason (R) : High Q means better selectivity.

38. Assertion (A) : For making integrated circuit the type of lithography chosen depends upon the feature size.

Reason (R) : UV lithography can easily be used for making nano size circuits.

39. Assertion (A) : In a parallel - in - serial out shift register data is loaded one bit at a time.

Reason (R) : A serial - in - serial out shift register can be used to introduce time delay in the circuits.

40. Assertion (A) : Architecturally 8086 μ p is totally different from its predecessor 8085 μ p but functionally it is downward compatible with 8085.

Reason (R) : The segmented architecture was introduced in 8086 μ p to keep compatibility with 8085 μ p.

41. **Assertion (A) :** If 'char a[10];' is defined in one file and 'extern char *a;' is declared in another file then it does not work.

Reason (R) : The declaration 'extern char *a;' does not declare an array and therefore does not match the actual definition.

42. **Assertion (A) :** A high electron mobility transistor is based upon modulation doped (GaAs - Al GaAs) single heterojunction structure.

Reason (R) : HEMT shows very high noise figure and very low gain at very high microwave frequencies upto 70 GHz.

43. **Assertion (A) :** Shot noise is due to random variations in current flow in active devices.

Reason (R) : Current is a flow of carriers each of which carries a finite amount of charge.

44. **Assertion (A) :** In a two transistor model the anode current is given by :

$$I_A = \frac{\alpha_2 I_G + I_{CBO_1} - I_{CBO_2}}{1 + (\alpha_1 - \alpha_2)}$$

Reason (R) : The regenerative or Latching action due to a positive feedback is demonstrated in a two transistor model of a thyristor. It contains a pnp & a npn transistors.

45. **Assertion (A) :** The closed loop pole - zero dipole introduced by PI controller does not contribute significantly to the transient response of the closed loop system.

Reason (R) : The PI controller adds a pole at $s = 0$ and a zero at $s = -z$ to the closed loop transfer function.

Based on the following para, answer Q. No. 46 to 50 :

Antennas are used to transmit and receive signals. The basic theory behind them is given by Maxwell's equations and electromagnetics. Its size depends upon the frequency used. Higher is the frequency lower are the dimension of antennas. Antennas are of various types, like resonant, non - resonant etc. They are different for different applications.

46. If 'Z' is the impedance of a simple dipole, the impedance of 'n' fold dipole is given by :

- (1) $n Z$ (2) $n^2 Z$ (3) Z/n (4) Z/n^2

47. The directivity of a small loop and a short dipole has the following ratio :
- (1) 2 : 1 (2) 1 : 2 (3) 1 : 1 (4) 1 : 4
48. Patch is a :
- (1) High gain wide band antenna (2) High gain narrow band antenna
(3) Low gain narrow band antenna (4) Low gain wide band antenna
49. The maximum gain for H - plane sectoral horn with slant length of 12λ occurs when aperture width is :
- (1) λ (2) 3λ (3) 6λ (4) 12λ
50. Helical antennas are often used for satellite tracking in VHF range because of :
- (1) Troposcatter (2) Super - refraction
(3) Ionospheric refraction (4) Faraday effect

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Space For Rough Work

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