

Roll No.

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(Write Roll Number from left side exactly as in the Admit Card)

Signature of Invigilators

1. _____
2. _____

2115

Question Booklet Series

A

PAPER-II

Question Booklet No.

Subject Code : 21

OMR Sheet No.

(To be filled by the candidate)

ELECTRONIC SCIENCE

Time : 1 Hour 15 Minutes

Maximum Marks: 100

Instructions for the Candidates

1. Write your Roll Number in the space provided on the top of this page as well as on the OMR Sheet provided.
2. At the commencement of the examination, the question booklet will be given to you. In the first 5 minutes, you are requested to open the booklet and verify it:
 - (i) To have access to the Question Booklet, tear off the paper seal on the edge of this cover page.
 - (ii) Faulty booklet, if detected, 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.
 - (iii) After this verification is over, the Question Booklet Series and Question Booklet Number should be entered on the OMR Sheet and the OMR Sheet Number should be entered on this Question Booklet.
3. This paper consists of fifty (50) multiple-choice type questions. All the questions are compulsory. Each question carries *two* marks.
4. Each Question has four alternative responses marked: **(A)** **(B)** **(C)** **(D)**. You have to darken the circle as indicated below on the correct response against each question.

Example: **(A)** **(B)** **(C)** **(D)**, where **(C)** is the correct response.
5. Your responses to the questions are to be indicated correctly in the OMR Sheet. If you mark your response at any place other than in the circle in the OMR Sheet, it will not be evaluated.
6. Rough work is to be done at the end of this booklet.
7. 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.
8. Do not tamper or fold the OMR Sheet in any way. If you do so, your OMR Sheet will not be evaluated.
9. You have to return the 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 question booklet and duplicate copy of OMR Sheet after completion of examination.
10. **Use only Blue/Black Ball point pen.**
11. **Use of any calculator or log table or mobile phone etc. is strictly prohibited.**
12. **There are no negative marks for incorrect answers.**

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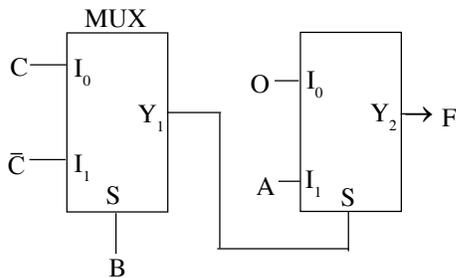
ELECTRONIC SCIENCE

PAPER II

1. When the starting address of 4K RAM is 8000H, the memory map will be
- (A) 8000H – 8500H
 (B) 8000H – 9000H
 (C) 8000H – 9500H
 (D) 8000H – A000H
2. Which of the following analog modulation scheme requires minimum transmitted power and minimum channel bandwidth?
- (A) VSB
 (B) DSB-SC
 (C) SSB
 (D) DSB-WC
3. When PORT A input, PORT B and PORT C output the control word of 8255 is
- (A) 80H
 (B) 90H
 (C) 85H
 (D) 98H
4. SIM instruction of 8085 microprocessor is used to
- (A) enable RST 7.5, 6.5 and 5.5
 (B) disable RST 7.5, 6.5 and 5.5
 (C) enable or disable RST 7.5, 6.5 and 5.5
 (D) None of the above
5. Vector potential is a Vector
- (A) whose curve is equal to the magnetic flux density.
 (B) whose curve is equal to the electric field intensity.
 (C) whose divergence is equal to the electric potential.
 (D) which is equal to the Vector product of the electric and the magnetic fields.
6. The numerical aperture (NA) of an optical fibre is a function of the refractive index/indices of the
- (A) core only
 (B) core and clad only
 (C) clad only
 (D) core and surrounding media
7. Power loss in an optical fibre is measured in
- (A) dB
 (B) dBm
 (C) dB/km
 (D) dB⁻¹
8. For the implementation of the Boolean function $Y=A+B\bar{C}+AC$ the minimum number of NAND gates requires are
- (A) 4
 (B) 6
 (C) 5
 (D) 3
9. Given that for a logic family
- V_{OH} : minimum output high level voltage
 V_{OL} : maximum output low level voltage
 V_{IH} : minimum acceptable input high level voltage
 V_{IL} : maximum acceptable input low level voltage
- The correct relationship is
- (A) $V_{IH} > V_{OH} > V_{IL} > V_{OL}$
 (B) $V_{OH} > V_{IH} > V_{IL} > V_{OL}$
 (C) $V_{IH} > V_{OH} > V_{OL} > V_{IL}$
 (D) $V_{OH} > V_{IH} > V_{OL} > V_{IL}$

[Please Turn Over]

10. The Boolean function F implemented in figure using 2-input Multiplexers is



- (A) $A\bar{B}C + AB\bar{C}$
- (B) $\bar{A}BC + \bar{A}\bar{B}C$
- (C) None of these
- (D) $\bar{A}\bar{B}C + \bar{A}BC$

11. For analog optical communication the detector of choice should be

- (A) Light depending resistor (LDR)
- (B) Phototransistor
- (C) Solar Cell
- (D) Photodiode

12. A 1mA ammeter has a resistance of 100Ω. It is to be converted to a 1A ammeter. The value of shunt resistance is

- (A) 0.001Ω
- (B) 0.100Ω
- (C) 1kΩ
- (D) 100Ω

13. The advantage of the moving coil permanent magnet type instrument is

- (A) low power consumption
- (B) no hysteresis loss
- (C) efficient eddy current damping
- (D) All of the above

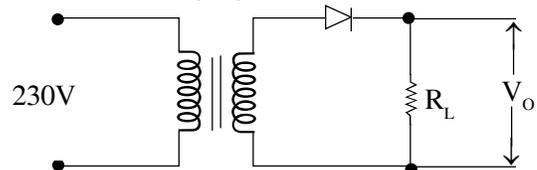
14. Which of the following type of amplifier operation causes maximum distortions?

- (A) Class - A
- (B) Class - B
- (C) Class - AB
- (D) Class - C

15. Class - B push-pull amplifier suffers from

- (A) inter modulation distortion
- (B) cross-over distortion
- (C) excessive harmonic distortions
- (D) phase distortions

16. An ac supply of 230V applied to a half wave rectifier through a transformer of turns ratio 10 : 1 as shown in the following figure



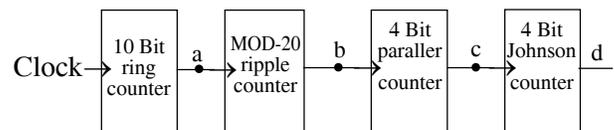
The dc output voltage and the minimum PIV of the diode are

- (A) 30.0V, 14V
- (B) 26.0V, 14V
- (C) 32.5V, 10.3V
- (D) 25.5V, 10.3V

17. A 10V dc regulator power supply has a regulation of 0.005%. Its output voltage will vary within an envelope of

- (A) ± 2.5 m volt
- (B) ± 0.5 m volt
- (C) ± 5 m volt
- (D) ± 0.05 m volt

18. What is the frequency of the pulse at point a, b, c and d in the circuit?



- (A) 20 Hz, 500 Hz, 33.25 Hz, 3.9 Hz
- (B) 10 KHz, 500 Hz, 31.25 Hz, 3.9 Hz
- (C) 10 Hz, 500 KHz, 31.25 Hz, 3.8 Hz
- (D) 100 KHz, 50 KHz, 31.25 MHz, 3.6 Hz

19. An 8-bit successive approximation A/D converter has full scale reading of 2.55V and its conversion time for an analog input of 1 Volt is 20 μ sec. The conversion time for a 2 Volt input will be

- (A) 30 μ sec
- (B) 10 μ sec
- (C) 20 μ sec
- (D) 50 μ sec

20. A two terminal device that exhibits a region of incremental negative resistance is a

- (A) Zener diode
- (B) tunnel diode
- (C) varactor
- (D) None of the above

21. When a Zener diode operates in the breakdown region, the voltage across it is substantially constant for a large change in current through it. So long as the voltage is greater than the Zener breakdown voltage the diode maintains a constant voltage across the load. This is the principle of

- (A) Zener diode regulated power supply
- (B) Varactor regulated power supply
- (C) None of the above
- (D) All of the above

22. The minimum phase system must have

- (A) all the poles and zeros in the right half of S-plane.
- (B) neither poles nor zeros in the right half of S-plane.
- (C) no poles on the right half of S-plane.
- (D) no zeros on the right half of S-plane.

23. In examining the stability of linear control system using Nyquist criterion, the system is stable if,

- (A) there is no encirclement of the $-1+j0$ point and there are no poles of $G(s) H(s)$ in the right half of S-plane.
- (B) there is a counter clockwise encirclement of the $-1+j0$ point and there are no poles on the right half of S-plane.
- (C) there is a clockwise encirclement of the $-1+j0$ point.
- (D) None of the above

24. For a step input, a plant transfer function shows a steady state error or offset. Such an offset can be eliminated if a

- (A) Differential control is included in the controller
- (B) PID control is included in the controller
- (C) Integral control is included in the controller
- (D) PD control is included in the controller

25. The range of K for which the system with characteristic equation

$$s^2 + Ks + 2K - 1 = 0$$

become stable is

- (A) $K > 0$
- (B) $K > \frac{1}{2}$
- (C) $K < 0$
- (D) $K < \frac{1}{2}$

26. The arrival angle of the root locus for the system with open loop transfer function

$$G(s) H(s) = \frac{K(s^2 + 1)}{s(s+1)}, K > 0$$

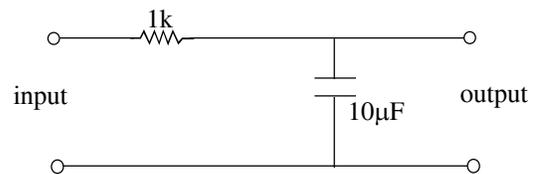
at the complex zero $s = j$ is

- (A) 45°
- (B) 90°
- (C) 135°
- (D) 225°

27. The Fermi level of an intrinsic semiconductor lies

- (A) near to the bottom of the conduction band.
- (B) near to the middle of the band gap.
- (C) near to the top of the valence band.
- (D) None of the above

28. In the figure, shown below, the steady state output voltage corresponding to the input voltage $3 + 4\sin 100t$ V is



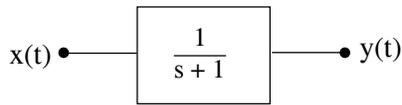
- (A) $3 + \frac{4}{\sqrt{2}} \sin(100t - \frac{\pi}{4})$ V
- (B) $3 + 4\sqrt{2} \sin(100t - \frac{\pi}{4})$ V
- (C) $\frac{3}{2} + \frac{4}{\sqrt{2}} \sin(100t + \frac{\pi}{4})$ V
- (D) $3 + 4 \sin(100t + \frac{\pi}{4})$ V

[Please Turn Over]

29. A random process $X(t)$ with power spectral density $S_{xs}(f)$ is passed through a linear time invariant system with transfer function $H(f)$. The power spectral density of the output process $S_{ys}(f)$ is given by

- (A) $S_{ys}(f) = S_{xs}(f) H(f)$
- (B) $S_{ys}(f) = S_{xs}(f) |H(f)|$
- (C) $S_{ys}(f) = S_{xs}(f) H^2(f)$
- (D) $S_{ys}(f) = S_{xs}(f) |H(f)|^2$

30. In the system shown below, $x(t) = (\sin t) u(t)$. In steady state, the response $y(t)$ will be



- (A) $\frac{1}{\sqrt{2}} \sin(t - \frac{\pi}{4})$
- (B) $\frac{1}{\sqrt{2}} \sin(t + \frac{\pi}{4})$
- (C) $\frac{1}{\sqrt{2}} e^{-t} \sin t$
- (D) $\sin t - \cos t$

31. In a PCM system, the level of quantizer is doubled, the signal to quantization noise ratio will be improved by

- (A) 3 dB
- (B) 6 dB
- (C) 8 dB
- (D) 10 dB

32. Bilinear transformation is used to convert analog filter to

- (A) IIR filter
- (B) FIR filter
- (C) both IIR and FIR filter
- (D) None of the above

33. LED emits

- (A) coherent light
- (B) non-coherent light
- (C) monochrome light
- (D) None of the above

34. A bridge is used for measuring an unknown inductance in terms of a known capacitance and resistance. That bridge is

- (A) Maxwell's L/C bridge
- (B) Hays bridge
- (C) Owen bridge
- (D) Anderson

35. Moving iron type of instrument can be used as

- (A) standard instrument for calibration of other instruments
- (B) transfer type instruments
- (C) indicator type instruments as on panels
- (D) All of the above

36. Choose the best answer.

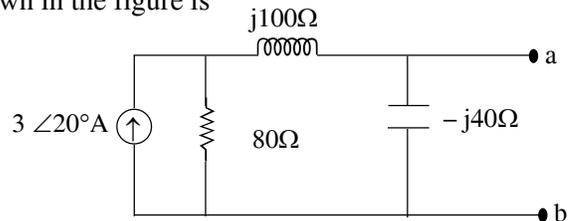
A function that does the same operation on different data types is to be implemented using

- (A) macros
- (B) overloading
- (C) function templates
- (D) default arguments

37. The 3-dB frequency of an amplifier is one at which gain reduces to

- (A) $\frac{1}{\sqrt{2}}$ of its mid-band gain
- (B) unity
- (C) zero
- (D) $\frac{1}{2}$ of the midband gain

38. The Thevenin's equivalent (R_{th}) of the circuit shown in the figure is



- (A) $49.58 - j12.79 \Omega$
- (B) $12.79 + j49.58 \Omega$
- (C) None of these
- (D) $12.79 - j49.58 \Omega$

39. The following program fragment

```
int i = 10;
void main ( )
{
    int i = 20;
    {
        int i = 30;
        Count << i << : : i;
    }
}
```

- (A) prints 3010
 (B) prints 3020
 (C) will result in a run time error
 (D) None of the above

40. A constructor, in C++ programming language, is called whenever

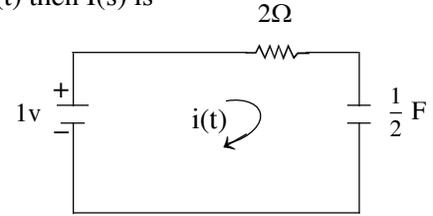
- (A) an object is declared
 (B) an object is used
 (C) a class is declared
 (D) a class is used

41. The declaration

```
int x; int &p = x;
is same as the declaration
int x, *p, p = &x;
This remark is
```

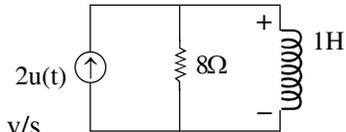
- (A) True
 (B) False
 (C) Some times true
 (D) None of the above

42. The series RC circuit shown in the figure below with the initial condition $v(0^-) = 2v$. If $I(s)$ is Laplace transform of $i(t)$ then $I(s)$ is



- (A) $\frac{1}{2(s+1)}$
 (B) $\frac{s}{2(s+1)}$
 (C) $\frac{-s}{2(s+1)}$
 (D) $-\frac{1}{2(s+1)}$

43. In the circuit shown below $\frac{dv(0^+)}{dt}$ is



- (A) -128 v/s
 (B) -64 v/s
 (C) 64 v/s
 (D) 128 v/s

44. How many bits of the jumping address are available in AJMP instruction of 8051 microcontroller?

- (A) 10 bits
 (B) 16 bits
 (C) 11 bits
 (D) 9 bits

45. The electrostatic potential is the

- (A) potential energy per unit charge
 (B) kinetic energy per unit charge
 (C) total energy per unit charge
 (D) None of the above

46. The unit of $\vec{\nabla} \times \vec{H}$ is

- (A) Ampere
 (B) Ampere/meter
 (C) Ampere/meter²
 (D) Ampere-meter

47. The Maxwell's equation, $\vec{\nabla} \times \vec{H} = \vec{J} + \frac{\partial \vec{D}}{\partial t}$ is based on

- (A) Ampere's law
- (B) Gauss's law
- (C) Faraday's law
- (D) Coulomb's law

48. If a plane electromagnetic wave satisfies the equation

in the $\frac{\partial^2 \vec{E}_x}{\partial z^2} = c^2 \frac{\partial^2 \vec{E}_x}{\partial t^2}$, the wave propagates

- (A) X – direction
- (B) Z – direction
- (C) Y – direction
- (D) X – y plane at an angle 45° between the X and Z directions.

49. The wavelength of a wave with propagation constant $(0.1\pi + j 0.2\pi)\text{m}^{-1}$ is

- (A) 30m
- (B) 10m
- (C) $\frac{2}{\sqrt{0.05}}$ m
- (D) 20m

50. The maximum efficiency of an AM modulator is

- (A) 25%
- (B) 50%
- (C) 33%
- (D) 100%

ROUGH WORK

2115-II

A-10

ROUGH WORK

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ROUGH WORK

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