Test Booklet Code & No.
प्रश्नपत्रिका कोड व क्र.

D

Paper-II
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)

MAY - 38216

Time Allowed : 1¼ Hours] **[Maximum Marks : 100**

Number of Pages in this Booklet : **16**

Number of Questions in this Booklet : **50**

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 **50** objective type questions. Each question will carry *two* marks. *All* questions of Paper-II 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 **50** बहुपर्यायी 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 अवश्य 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.**

Electronic Science

Paper II

Time Allowed : 75 Minutes] **[Maximum Marks : 100**

Note : This Paper contains **Fifty (50)** multiple choice questions. Each question carries **Two (2)** marks. Attempt *All* questions.

1. An a.c. full wave voltage controller has a resistive load of 10 Ω and rms input voltage is 120 V, 60 Hz. The thyristor switch is ON for 25 cycles and OFF for 75 cycles, the rms voltage will be :

   (A) 30 V

   (B) 40 V

   (C) 100 V

   (D) 60 V

2. In a.c. drives the voltage and frequency can be controlled by :

   (A) Slip power recovery scheme

   (B) Voltage-source inverter

   (C) Current-source inverter

   (D) Chopper

3. A gas LASER uses :

   (A) only spontaneous emission

   (B) only stimulated absorption

   (C) spontaneous emission and stimulated absorption

   (D) spontaneous absorption and stimulated emission

4. A solar cell characteristic can be explained as a diode characteristic in the :

   (A) IVth quadrant

   (B) Ist quadrant

   (C) IInd quadrant

   (D) IIIrd quadrant

5. In optical fibre :

   (A) only TM mode propagates

   (B) only TE and TEM mode propagates

   (C) only HE mode propagates

   (D) TEM, TE, TM, HE and EH modes propagate

6. Validity of flow of two charge carriers, that is holes and electrons in semiconductor was experimentally verified by :

(A) Thermoelectric effect

(B) Piezoelectric effect

(C) Photoelectric effect

(D) Hall effect

7. The screen of the CRT is coated with ..... fluorescent material to obtain blue colour.

(A) Calcium tungstate

(B) Zinc orthosilicate

(C) Zinc cadmium sulphide

(D) Graphite

8. A known period of time is obtained in the block diagram of frequency meter using :

(A) Hartley oscillator

(B) Colpitt's oscillator

(C) Crystal oscillator

(D) Wien bridge oscillator

9. A close loop system is stable when all its poles in 'S' plane lie :

(A) On the positive real axis

(B) On the imaginary axis

(C) In the left half

(D) In the right half

10. In a linear control system Bode plot analysis is done to find :

(A) Gain and phase margin

(B) Instability of the system

(C) Static response of the system

(D) Dynamic behaviour of the system

11. The reverse saturation current in a p-n diode depends on :

(A) n_i

(B) n_i^2

(C) n_i^3

(D) n_i^4

where n_i is intrinsic concentration.

12. In Zener breakdown the initial avalanche is created due to :

(A) electron-electron collision

(B) electron-ion collision

(C) hole-ion collision

(D) direct breaking of bonds

13. A tunnel diode has :

(A) highly doped p-side

(B) highly doped p and n side

(C) highly doped n-side

(D) both p and n are lightly doped

14. For single crystal growth the following defects are needed :

(A) dislocation

(B) vacancies

(C) interstitials

(D) grain boundaries

15. Metal for good Ohmic contact for p-type silicon is :

(A) gold

(B) silver

(C) aluminum

(D) copper

16. Current equivalent is obtained using ..... theorem.

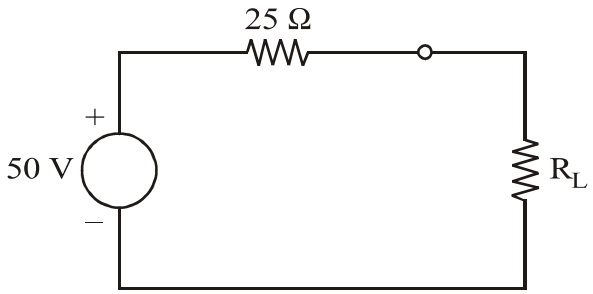
(A) Superposition

(B) Norton's

(C) Thevenin's

(D) Max power transfer

17. In the circuit shown below determine the value of load resistance (R_L) when the load resistance draws maximum power. Also find the value of the maximum power :



(A) 12.5 Ω, 50 W

(B) 25 Ω, 25 W

(C) 50 Ω, 50 W

(D) 12.5 Ω, 12.5 W

18. $\frac{1}{s^2}$ has ..... of s-plane.

(A) two poles at origin

(B) a single pole at origin

(C) two zeros at origin

(D) two poles at infinite

19. Determine the final value of the function $f(t)$ whose Laplace transform is :

$$F(s) = \frac{2(s+1)}{s(s+3)(s+4)^2}$$

(A) 24

(B) $\frac{1}{12}$

(C) $\frac{1}{8}$

(D) $\frac{1}{24}$

20. The time constant of a series RL circuit is :

(A) LR

(B) $\frac{R}{L}$

(C) $\frac{L}{R}$

(D) $e^{-R/L}$

21. The amplitude of ripple voltage across a full wave rectifier is :

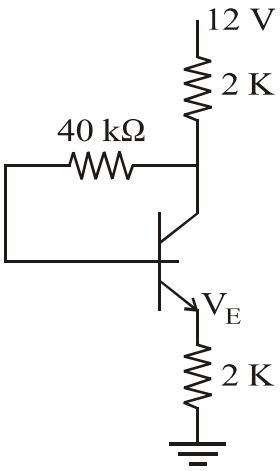
(A) difference between maximum and minimum deviation from average d.c.

(B) difference of maximum from zero

(C) difference of minimum from zero

(D) rms value of fluctuation around d.c.

22.



Given that $\beta = 19$, $V_E = 4$ V For the circuit shown in the figure, the base current I_b is :

(A) 1 mA

(B) 0.1 mA

(C) 10 mA

(D) 5 mA

23. If the feedback network does *not* contain reactive elements :

(A) frequency is highly distorted

(B) phase is highly distorted

(C) both are highly distorted

(D) both have reduced distortion

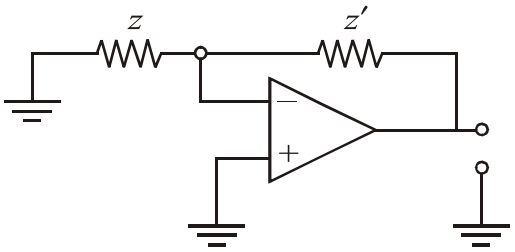
24. For Wien's bridge oscillator, the oscillation condition is obtained by adjusting ratio $R_2/(R_1 + R_2)$:

(A) smaller than $\frac{1}{3}$

(B) greater than $\frac{1}{3}$

(C) equal to $\frac{1}{2}$

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

25. 

For the OP-Amp configuration in the figure, the condition of oscillation is :

$$\beta_{Av}\left(\frac{zz'}{z+z'}\right) =$$

(A) 0

(B) ∞

(C) $1\angle 180°$

(D) $1\angle 90°$

26. The digital logic family which has minimum power dissipation is :

(A) TTL

(B) RTL

(C) DTL

(D) CMOS

27. Data can be changed from spatial code to temporal code by using :

(A) Shift registers

(B) Counters

(C) Combinational circuits

(D) A/D converter

28. A ring counter consisting of five flip-flops will have :

(A) 5 states

(B) 10 states

(C) 32 states

(D) Infinite states

29. The speed of conversion is maximum in :

(A) Successive Approximation A/D converter

(B) Parallel Comparative A/D converter

(C) Counter-ramp A/D converter

(D) Dual-slope A/D converter

30. The following switching functions are to be implemented using a decoder :

$f_1 = \sum m(1, 2, 4, 8, 10, 14)$

$f_2 = \sum m(2, 5, 9, 11)$

$f_3 = \sum m(2, 4, 5, 6, 7)$

The minimum configuration of the decoder will be :

(A) 2-to-4 line

(B) 3-to-8 line

(C) 4-to-16 line

(D) 5-to-32 line

31. 64-bit data word consists of :

(A) 4 bytes

(B) 8 bytes

(C) 10 nibbles

(D) 18 nibbles

32. Using 8085 microprocessor address and control lines we can directly access :

(A) 64 K memory devices

(B) 64 K memory and I/O devices

(C) 64 K memory and 64 K I/O devices

(D) 64 K memory and 256 I/O devices

33. Match the following and select the *correct* answer using the codes given below :

(*a*)	TCON	(*i*)	contains status information
(*b*)	SBUF	(*ii*)	timer/counter control register
(*c*)	TMOD	(*iii*)	idle bit, power down bit
(*d*)	PSW	(*iv*)	serial data buffer for T_x and R_x
(*e*)	PCON	(*v*)	timer/counter modes of operation

Codes :

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

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

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

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

34. If the ..... pin in 8051 is ....., then we have the option of using the ..... ROM or EPROM together with ..... memory and devices.

(A) EA, high, internal, external

(B) EA, low, internal, external

(C) EA, high, external, internal

(D) EA, low, external, internal

35. After reset, SP register of 8051 is initialized to address ..... .

(A) 8H

(B) 9H

(C) 7H

(D) 6H

36. The formatted data is written in a file by use of fprinf(fp, "format", {data variables}); the fp in this statement represents :

(A) pointer to the data variables

(B) previously defined file pointer with the specific file name

(C) pointer storing data format

(D) file name

37. In mathematics and computer programming which is the correct order of mathematical operators :

(A) addition, subtraction, multiplication, division

(B) multiplication, addition, division, subtraction

(C) division, multiplication, addition, subtraction

(D) addition, division, multiplication, subtraction

38. In higher level language (C/C++) programming which of the following statements is used to generate variable time delay from 10 μs to 10 hrs ?

(A) While-do

(B) Do-while

(C) If-then-else

(D) for loop

39. What will be the output of execution of the following 'C' program ?

```
# include <stdio.h>
# include <math.h>
int name( )
{printf("fmod of 3.14/2.1 is %1f/n", fmod(3.14/2.1)); return(0);}
```

(A) fmod of 3.14/2.1 is 1.0000

(B) 1.040000

(C) fmod of 3.14/2.1 is 1.040000

(D) 1.5

40. What will be the output of the following code ?

```
# include <stdio.h>
void main( )
{
    char suite = 3;
    switch(suite)
    {
        case 1 :
            printf("SET PUNE");
        case 2 :
            printf("SET is easy");
        default :
            printf("SET is difficult");
    }
    printf("SET is worth trying");
}
```

(A) SET PUNE

(B) SET is easy

(C) SET is difficult

(D) SET is worth trying

41. Curl of magnetic field $\vec{H}$ in a dielectric medium of dielectric constant $\in$ is :

(A) $\vec{J} + \in \frac{\partial \vec{E}}{\partial t}$

(B) 0

(C) ρ

(D) $-\frac{\partial \vec{B}}{\partial t}$

where, $\vec{J}$ is current density, $\vec{E}$ is electric field and $\vec{B}$ is magnetic intensity.

42. The S-matrix corresponding to magic-T is a 4 × 4 matrix with :

(A) all diagonal elements non-zero

(B) two diagonal elements non-zero

(C) all diagonal elements zero

(D) only one diagonal element is zero

43. If the electric field and magnetic field around antenna differs in phase by 90°, with $(1/r^2)$ dependence :

(A) the electric energy dissipates

(B) the energy oscillates between electric and magnetic field

(C) the magnetic energy dissipates

(D) the electric and magnetic energies are independent in time

44. A 100 Ω transmission line is connected to a load of 900 Ω. For impedance matching a λ/4 matching transformer should have the characteristic impedance :

(A) 300 Ω

(B) 100 Ω

(C) 900 Ω

(D) 3 Ω

45. Gunn effect is a property observed in :

(A) semiconductor junction

(B) bulk semiconductor

(C) metal semiconductor contact

(D) metal-insulator contact

46. To maintain reasonable pulse energy in pulse modulation one of the following techniques is employed :

(A) sample-and-hold

(B) quantizing

(C) switching sampler

(D) antialiasing filter

47. If a digital signal is used to switch the carrier between amplitude levels, then it is referred as :

(A) PSK

(B) FSK

(C) ASK

(D) PCM

48. If 15-watt modulated carrier is frequency modulated with a sinusoidal signal such that the frequency deviation is 6 kHz. The frequency of the modulating signal is 1 kHz. Determine the modulation index :

(A) 0.33

(B) 6

(C) 2.5

(D) 15

49. At 100% Amplitude modulation, the power in any one side frequency component is :

(A) 4 P_C

(B) 1.5 P_C

(C) 3 P_C

(D) $P_C/4$

(where P_C is average carrier power)

50. A ..... filter affects only the phase, and not the amplitude of the signal.

(A) Low-Pass

(B) Band-Pass

(C) All-Pass

(D) High-Pass

ROUGH WORK

ROUGH WORK