Test Booklet Code & Serial No.
प्रश्नपत्रिका कोड व क्रमांक

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)

JAN - 38218

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. TRIAC is a bidirectional power electronic device which contains :

   (A) Two BJTs connected in parallel

   (B) Two *pn* junction diodes connected in series

   (C) Two SCRs connected in reverse parallel

   (D) Two SCRs connected in series

2. In a step down chopper using pulse width modulation, $T_{ON} = 9 \times 10^{-3}$ s and $T_{OFF} = 1 \times 10^{-3}$ s. The chopping frequency is :

   (A) 200 Hz

   (B) 1000 Hz

   (C) 500 Hz

   (D) 100 Hz

3. Colour of light emitted by LED depends on :

   (A) Reflector used in construction

   (B) Magnitude of forward bias

   (C) Energy band gap

   (D) Forward current

4. Which is the major cause of dispersion in multimode step index optical fiber ?

   (A) Intermodal

   (B) Material

   (C) Wave guide

   (D) Chromatic

5. Molecular size of SiO_2 in optical fiber leads to the following :

(A) Absorption

(B) Scattering

(C) Pulse dispersion

(D) Strain

6. Strain gauge is a/an :

(A) Active device and converts mechanical displacement into a change of resistance.

(B) Passive device and converts electrical displacement into a change of resistance.

(C) Passive device and converts mechanical displacement into a change of resistance.

(D) Active device and converts electrical displacement into a change of resistance.

7. Which of the following are integrating instruments ?

(A) Ammeters

(B) Voltmeters

(C) Wattmeters

(D) Ampere-hour and Watt-hour meters

8. A piezoelectric force transducer has a charge sensitivity of 20 pC/N. It is connected to a charge amplifier and overall gain of transducer and amplifier is 50 mV/N. The gain of the amplifier is :

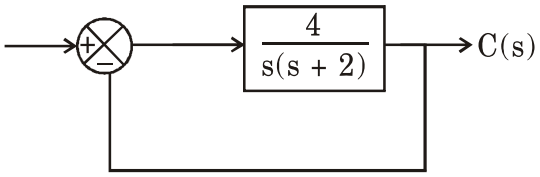
(A) 1 mV/pC

(B) 1·5 mV/pC

(C) 2·5 mV/pC

(D) 4 mV/pC

9. For the system shown in the following figures, the damping ratio of closed loop poles is :



(A) 1·5

(B) 1

(C) 0·5

(D) 0·25

10. A PI controller increases :

(A) Type of system by 1

(B) Order of system by 1

(C) Type and order of system decreases by 1

(D) Type and order of system increases by 1

11. The potential barrier in a *pn*-junction is formed after stabilizing the carrier transport. Under this condition :

(A) Drift Current > Diffusion Current

(B) Drift Current < Diffusion Current

(C) Drift Current = Diffusion Current

(D) Drift Current >> Diffusion Current

12. In the breakdown region, a Zener diode behaves like a.....source.

(A) Constant voltage

(B) Constant current

(C) Constant current sink

(D) Constant power

13. Most of the majority carriers from the emitter :

(A) Recombine in the base

(B) Recombine in the emitter

(C) Pass through the base region to the collector

(D) Remain in the base

14. An enhancement type, basically termed as normally OFF N-MOSFET works only with :

(A) Large positive gate voltage

(B) Large negative gate voltage

(C) Large positive drain voltage

(D) Large negative drain voltage

15. The process of selectively removing certain protective regions from the surface of a substrate is known as :

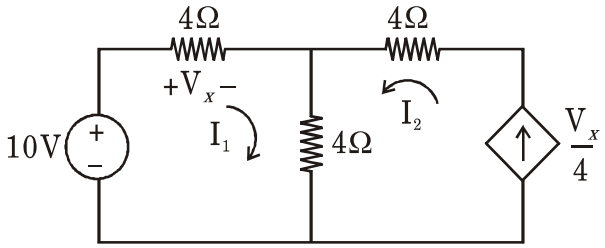
(A) Epitaxy

(B) Lithography

(C) Metalization

(D) Bonding

16. Refer to the network shown in the following figure :



The tie set matrix is :

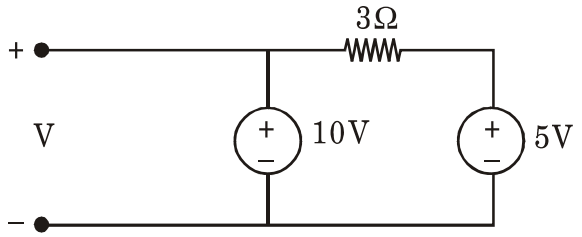
(A) [1, 1]

(B) [4, 4]

(C) [10, 25]

(D) [10, 4]

17. The voltage V in the circuit shown in the following figure is :



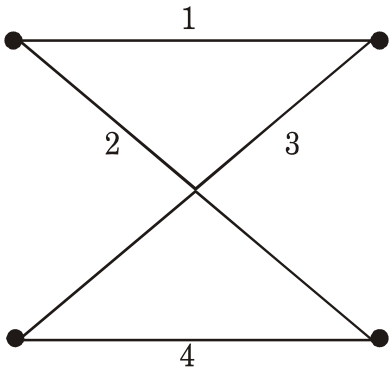
(A) 10 V

(B) 15 V

(C) 5 V

(D) 3 V

18. In the graph shown in the following figure, the number of trees (P) and the number of cut sets (Q) are :



(A) P = 2, Q = 2

(B) P = 2, Q = 6

(C) P = 4, Q = 6

(D) P = 4, Q = 10

19. The Fourier series of a real periodic function has only :

P : cosine terms if it is even

Q : sine terms if it is odd

R : cosine terms if it is odd

S : sine terms if it is even

Which of the above statements are *correct* ?

(A) P and S

(B) P and Q

(C) P and R

(D) Q and R

20. The trigonometric Fourier series of a periodic time function can have only :

(A) cosine terms

(B) sine terms

(C) DC and cosine terms

(D) cosine and sine terms

21. Calculate the cut-off frequency of an OP-Amp based first order low pass filter for R = 2·5 kΩ and C = 0·05 μF.

(A) 1·273 kHz

(B) 12·73 kHz

(C) 127·3 kHz

(D) 127·3 Hz

22. Current sense resistor in a voltage regulator circuit is placed at :

(A) Across the pass transistor

(B) Parallel to the load resistor

(C) In series with emitter of pass transistor

(D) In series with the collector of pass transistor

23. According to transfer characteristics of XLL the phase error between VCO output and incoming signal must be maintained between..... in order to maintain a lock.

(A) 0 and π

(B) 0 and π/2

(C) 0 and 2π

(D) π and 2π

24. Voltage regulator LM 723 is best suited for voltage regulation :

(A) 0 to 40 V

(B) 0 to 27 V

(C) 9·5 to 40 V

(D) 2 to 37 V

25. The output of a rectifier circuit without filter is :

(A) 50 Hz AC

(B) Smooth DC

(C) Pulsating DC

(D) 25 Hz DC

26. For a NAND gate having two inputs the output is low (0) only :

(A) When both inputs are high

(B) When both inputs are low

(C) When any one of the inputs is high and other is low

(D) When a specified input is high and other is low

27. Synchronous counters are different from ripple counters in which clock pulses are applied ?

(A) In cascade manner to all flip-flops

(B) To the inputs of all flip-flops

(C) To the even number of flip-flops

(D) To the odd number of flip-flops

28. An OR gate in positive logic functions as :

(A) AND gate in Negative logic

(B) NAND gate in Negative logic

(C) NOR gate in Negative logic

(D) NOT gate in Negative logic

29. Boolean algebra *does not* apply to the relation :

(A) 0 + 0 = 0

(B) 0 + 1 = 1

(C) 1 + 1 = 1

(D) 0 – 1 = 1

30. Commutative law for addition and multiplication holds good for :

(A) OR gate only

(B) AND gate only

(C) Both OR and AND gate

(D) NOT gate only

31. What is the order decided by a processor or the CPU of a controller to execute an instruction ?

(A) Decode, fetch, execute

(B) Execute, fetch, decode

(C) Fetch, execute, decode

(D) Fetch, decode, execute

32. An internal RAM memory of the 8051 is :

(A) 32 bytes

(B) 64 bytes

(C) 128 bytes

(D) 64 k bytes

33. IO/$\overline{M}$ signal is generally used for distinguishing between :

(A) Data entry from keyboard and memory device

(B) Memory mapped IOs and IO mapped IOs

(C) Serial and parallel communication

(D) Synchronous and asynchronous data transfers

34. When PUSH PSW instruction is executed, the stack pointer :

(A) Decrements by 1

(B) Increments by 1

(C) Increments by 2

(D) Decrements by 2

35. The width of the instruction queue/ pipeline in 8086 microprocessor is :

(A) 4-bytes

(B) 6-bytes

(C) 8-bytes

(D) 2-bytes

36. In C++ ..... operator is used for Dynamic memory allocation.

(A) Scope resolution

(B) Conditional

(C) New

(D) Membership access

37. The.....objects have values that can be tested for various error conditions.

(A) osstream

(B) ofstream

(C) stream

(D) ifstream

38. In C++/C operators such as..... cannot be overloaded.

(A) +

(B) + +

(C) : :

(D) = =

39. The first index number in an array starts with.....and the index number of an array of size n will be :

(A) 0, $n - 1$

(B) 1, $n - 1$

(C) 0, n

(D) 1, n

40. To overload an operator..... keyword must be used along with the operator to be overloaded.

(A) Over

(B) Overload

(C) Void

(D) Operator

41. Ohm's law when applied to electromagnetic phenomenon gives the following expression :

(A) $\overline{J} = \sigma\overline{E}$

(B) V = IR

(C) $\sigma = \overline{J}\overline{E}$

(D) $\overline{E} = \overline{J}\sigma$

42. What is the amplitude of the displacement current density in A/m^2 inside a capacitor where $\overline{D} = 3 \times 10^{-7} \sin (6 \times 10^7 t - 0{\cdot}35x)\, \hat{a}_z$ C/m^2 and $\in_r = 100$.

(A) 3 A/m^2

(B) 6 A/m^2

(C) 9 A/m^2

(D) 18 A/m^2

43. A transmission line when terminated in a certain load has a reflection coefficient of 1/3. What will be the VSWR ?

(A) 1

(B) 2

(C) 2·5

(D) 3

44. In which of the following devices mobility of the electrons decreases as the electric field strength increases over a certain range ?

(A) Si

(B) Ge

(C) GaAs

(D) Metals

45. A Gunn diode of thickness 7 μm has a drift velocity of 1×10^5 m/s, find the transit time of an electron :

(A) 7×10^{-11} s

(B) 7×10^{-1} s

(C) 7×10^{-6} s

(D) 7 s

46. A signal $x_1(t)$ is bandlimited to 2 kHz while $x_2(t)$ is bandlimited to 3 kHz. The Nyquist sampling rate for signal $x_1(t)$ $x_2(t)$ shall be :

(A) 10 kHz

(B) 4 kHz

(C) 6 kHz

(D) 12 kHz

47. The maximum dynamic range for a linear PCM system using 16-bit quantizing :

(A) 98·08 dB

(B) 49·04 dB

(C) 32 dB

(D) 16 dB

48. A modular transmits symbols, each of which has sixty four different possible states, 10,000 times per second. The baud rate and bit rate are :

(A) 10 kbaud, 60 kb/s

(B) 10 kbaud, 30 kb/s

(C) 0·64 Mbaud, 60 kb/s

(D) 10 kbaud, 10 kb/s

49. Choose the *correct* statement :

(A) Narrowband FM offers better SNR than AM

(B) Narrowband FM offers poor SNR than AM

(C) Narrowband FM offers no improvement in SNR over AM

(D) Narrowband FM augments SNR as compared to AM

50. In order to transmit at 4·8 kbps over a channel with 3·2 kHz bandwidth, which would be most suitable ?

(A) BPSK

(B) QPSK

(C) 8-PSK

(D) 16-PSK

ROUGH WORK

ROUGH WORK