

Test Booklet Code & Serial No.

प्रश्नपत्रिका कोड व क्रमांक

A**Paper-II****ELECTRONIC SCIENCE****Signature and Name of Invigilator**

Seat No.

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1. (Signature)

(In figures as in Admit Card)

(Name)

Seat No.

(In words)

2. (Signature)

(Name)

OMR Sheet No.

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(To be filled by the Candidate)

APR - 38217**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**

- Write your Seat No. and OMR Sheet No. in the space provided on the top of this page.
- 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).
- 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 :
 - 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.
 - 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.**
 - After this verification is over, the OMR Sheet Number should be entered on this Test Booklet.
- 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)
(C)
(D)
- 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.
- Read instructions given inside carefully.
- Rough Work is to be done at the end of this booklet.
- 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.
- 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.
- Use only Blue/Black Ball point pen.**
- Use of any calculator or log table, etc., is prohibited.**
- There is no negative marking for incorrect answers.**

विद्यार्थ्यांसाठी महत्वाच्या सूचना

- परिक्षार्थींनी आपला आसन क्रमांक या पृष्ठवरील वरच्या कोपऱ्यात लिहावा. तसेच आपणांस दिलेल्या उत्तरपत्रिकेचा क्रमांक त्याखाली लिहावा.
- 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.
- परीक्षा सुरू झाल्यावर विद्यार्थ्याला प्रश्नपत्रिका दिली जाईल. सुरुवातीच्या 5 मिनिटांमध्ये आपण सदर प्रश्नपत्रिका उघडून खालील बाबी अवश्य तपासून घ्याव्यात.
 - प्रश्नपत्रिका उघडण्यासाठी प्रश्नपत्रिकेवर लावलेले सील उघडावे. सील नसलेली किंवा सील उघडलेली प्रश्नपत्रिका स्विकारू नये.
 - पहिल्या पृष्ठावर नमूद केल्याप्रमाणे प्रश्नपत्रिकेची एकूण पृष्ठे तसेच प्रश्नपत्रिकेतील एकूण प्रश्नांची संख्या पडताळून घ्यावी. पृष्ठे कमी असलेली/कमी प्रश्न असलेली/प्रश्नांचा चुकीचा क्रम असलेली किंवा इतर त्रुटी असलेली सदोष प्रश्नपत्रिका सुरुवातीच्या 5 मिनिटातच पर्यवेक्षकाला परत देऊन दुसरी प्रश्नपत्रिका मागवून घ्यावी. त्यानंतर प्रश्नपत्रिका बदलून मिळणार नाही तसेच वेळी वाढवून मिळणार नाही याची कृपया विद्यार्थ्यांनी नोंद घ्यावी.**
 - वरीलप्रमाणे सर्व पडताळून पहिल्यानंतरच प्रश्नपत्रिकेवर ओ.एम.आर. उत्तरपत्रिकेचा नंबर लिहावा.
- प्रत्येक प्रश्नासाठी (A), (B), (C) आणि (D) अशी चार विकल्प उतरे दिली आहेत. त्यातील योग्य उत्तराचा रकाना खाली दर्शविल्याप्रमाणे ठळकपणे काळ/निळ करवा.
उदा. : जर (C) हे योग्य उत्तर असेल तर.

(A)
(B)
(C)
(D)
- या प्रश्नपत्रिकेतील प्रश्नांची उतरे ओ.एम.आर. उत्तरपत्रिकेतच दर्शवावीत. इतर ठिकाणी लिहीलेली उतरे तपासली जाणार नाहीत.
- आत दिलेल्या सूचना काळजीपूर्वक वाचाव्यात.
- प्रश्नपत्रिकेच्या शेवटी जोडलेल्या कोऱ्या पानावरच कच्चे काम करावे.
- जर आपण ओ.एम.आर. वर नमूद केलेल्या ठिकाणा व्यतिरिक्त इतर कोठेही नाव, आसन क्रमांक, फोन नंबर किंवा ओळख पटेल अशी कोणतीही खुण केलेली आढळून आल्यास अथवा असभ्य भाषेचा वापर किंवा इतर गैरमार्गाचा अवलंब केल्यास विद्यार्थ्याला परीक्षेस अपात्र ठरविण्यात येईल.
- 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.
- फक्त निळ्या किंवा काळ्या बॉल पेनचाच वापर करावा.**
- कॅलक्युलेटर किंवा लॉग टेबल वापरण्यास परवानगी नाही.**
- चुकीच्या उत्तरासाठी गुण कपात केली जाणार नाही.**

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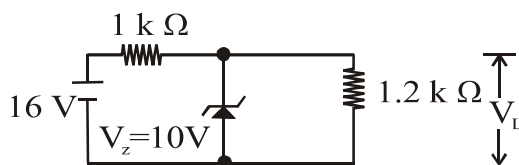
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Electronic Science Paper II

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

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

1. For the circuit shown in figure, the value of V_L will be :



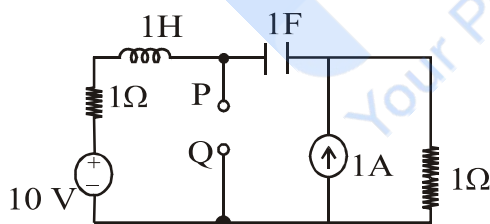
- (A) 10 V
(B) 8.73 V
(C) 9.27 V
(D) 7.27 V
2. In an unbiased p-n junction :
- (A) High potential at n side and low potential at p side
(B) High potential at p side and low potential at n side
(C) p and n both are at the same potential
(D) Undetermined
3. In what state is a silicon diode, if the voltage drop across it is about 0.7 V ?
- (A) No bias
(B) Forward bias
(C) Reverse bias
(D) Zener region
4. When the current gain increases from 50 to 300 in an emitter-biased, the collector current :
- (A) Remains almost the same
(B) Decreases by a factor of 6
(C) Increases by a factor of 6
(D) is zero
5. Epitaxy in IC Fabrication is a process of :
- (A) Separating individual chips from wafer
(B) Layer by layer growth of single crystal
(C) Deposition of metal interconnect patterns
(D) Connecting the pads on the chip to package pins.

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6. Relative to a given fixed tree of a network :

- (A) Link currents form an independent set
- (B) Branch currents form an independent set
- (C) Link voltages form an independent set
- (D) Branch voltages form an independent

7. The Thevenin equivalent impedance Z_{TH} between the nodes P and Q in the circuit shown in the following figure is :

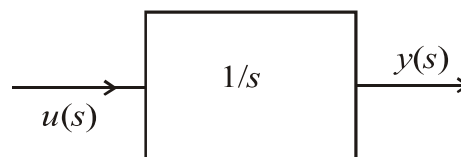


- (A) 1
- (B) $1 + s + 1/s$
- (C) $2 + s + 1/s$
- (D) $(s^2 + s + 1)/(s^2 + 2s + 1)$

8. The nodal method of circuit analysis is based on :

- (A) Kirchhoff's voltage law and Ohm's law
- (B) Kirchhoff's current law and Ohm's law
- (C) Kirchhoff's current law and Kirchhoff's voltage law
- (D) Kirchhoff's current law, Kirchhoff's voltage law and Ohm's law

9. Assuming zero initial condition, the response $y(t)$ of the system (shown in the following figure) to a unit step input $u(t)$ is :



- (A) $u(t)$
- (B) $e^{-t} u(t)$
- (C) $t u(t)$
- (D) $t^2 u(t)$

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10. Choose the function $f(t)$, $-\infty < t < \infty$, for which a Fourier series cannot be defined :

(A) $3 \sin (25 t)$
 (B) $4 \cos (20 t + 3) + 2 \sin(710 t)$
 (C) 1
 (D) $\exp (-|t|) \sin (25 t)$

11. How many op-amps are required to implement the following equation ?

$$V_0 = - \left[\frac{R_f}{R_1} V_1 + \frac{R_f}{R_2} V_2 + \frac{R_f}{R_3} V_3 \right]$$

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

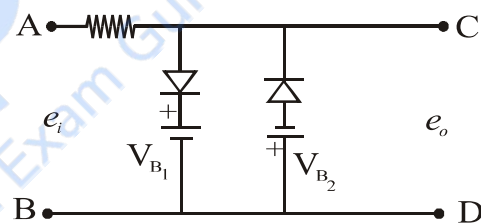
12. In a typical $n-p-n$ transistor with junction voltages at 25°C , which of the following is least in case of Si transistor :

(A) $V_{CE(\text{sat})}$
 (B) $V_{BE(\text{sat})}$
 (C) $V_{BE(\text{active})}$
 (D) $V_{BE(\text{cutin})}$

13. In case of transistor switching circuits the rise time and fall time is significantly affected by :

(A) Emitter capacitance
 (B) Base capacitance
 (C) Collector transition capacitance
 (D) Base to emitter capacitance

14. The circuit shown in the following figure acts as :



(A) Both positive and negative biased clipper
 (B) Both positive and negative clipper
 (C) Positive and negative biased clipper
 (D) Positive biased and negative clipper

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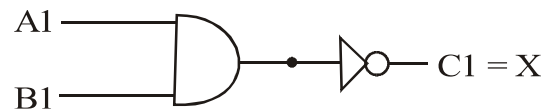
15. In an open loop op-amp circuit, whenever the inverting input (-) is negative relative to the non-inverting input (+), the output will :

- (A) swing negative
- (B) close the loop
- (C) be balanced
- (D) swing positive

16. In the logic family which has the minimum power dissipation :

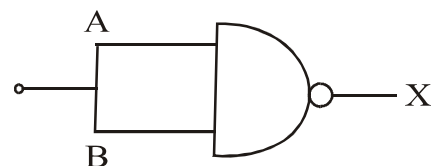
- (A) TTL
- (B) RTL
- (C) DTL
- (D) CMOS

17. The Boolean expression for the gate circuit shown below is :



- (A) $\overline{A1 \cdot B1} = X$
- (B) $A1 \cdot B1 = X$
- (C) $A1 + B1 = X$
- (D) $\overline{A1 + B1} = X$

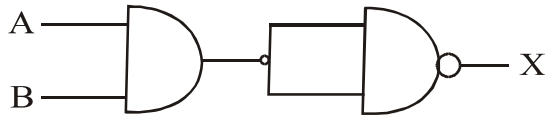
18. The name of the following gate is :



- (A) NAND gate
- (B) OR gate
- (C) NOR gate
- (D) NOT gate

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19. The combination of gates shown below yields :



- (A) AND gate
(B) NAND gate
(C) NOR gate
(D) NOT gate
20. The following table

A	B	X
0	0	1
0	1	1
1	0	1
1	1	0

is a truth table for :

- (A) NAND gate
(B) NOR gate
(C) XOR gate
(D) AND gate

21. DPTR is a 8051 register :

- (A) Pointing to external memory
(B) Storing computational results
(C) Used for serial communication
(D) Defining internal memory map

22. What does the symbol '#' represent in the instruction MOV A, #

55H ?

- (A) Direct data type
(B) Indirect data type
(C) Immediate data type
(D) Indexed data type

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23. What does the availability of LCD in 16×2 typical value indicate ?
- (A) 16 lines per character with 2 such lines
- (B) 16 characters per line with 2 such lines
- (C) 16 pixels per line with 2 such sets
- (D) 16 lines per pixel with 2 such sets
24. Which of the following is responsible for specifying address of a memory location ?
- (A) Control bus
- (B) Hard disk
- (C) RAM
- (D) Address bus
25. An interrupt which has a specific ISR address associated with it is known as :
- (A) High priority interrupt
- (B) Low priority interrupt
- (C) Vectored interrupt
- (D) Scalar interrupt
26. Everything defined at the program scope level (*i.e.* outside functions and classes) is said to be :
- (A) Local scope
- (B) Regional scope
- (C) Global scope
- (D) Static scope

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27. Because the lifetime of a local variable is limited and determined automatically, these variables are also called
- (A) Automator
- (B) Automatic
- (C) Dynamic
- (D) Static
28. allows that a section of a program is compiled only if the defined constant that is specified as the parameter has been defined, independently of its value.
- (A) # ifdef
- (B) # if
- (C) # define
- (D) # ifd
29. Which function returns the current position of the get or put pointer in bytes ?
- (A) tellg()
- (B) tellp()
- (C) tell()
- (D) Both (A) and (B)
30. Which of the following types of classes allows only one object of it to be created ?
- (A) Virtual class
- (B) Abstract class
- (C) Singleton class
- (D) Friend class

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31. The electric field intensity at a point (1, 2, 2) in Cartesian coordinates is (assuming $\hat{a}_x$, $\hat{a}_y$ and $\hat{a}_z$ to be unit vectors along z , y and x axes respectively) :
- (A) $\hat{a}_x + 2\hat{a}_y + 2\hat{a}_z$
- (B) $\hat{a}_x + \frac{1}{2}\hat{a}_y + \frac{1}{2} + \hat{a}_z$
- (C) $\frac{1}{3}\hat{a}_x + \frac{2}{3}\hat{a}_y + \frac{2}{3} + \hat{a}_z$
- (D) $\hat{a}_x + \frac{1}{2}\hat{a}_y + \frac{2}{3} + \hat{a}_z$
32. For an electromagnetic wave propagating in free space with $f = (1000/2\pi)$ MHz, determine phase-shift constant in rad/m.
- (A) 1 rad/m
- (B) 3.33 rad/m
- (C) 6.33 rad/m
- (D) 10 rad/m
33. A quarter wave transmission line section is used to match a 75Ω line to a 300Ω load. What should be the characteristic impedance of the line from which the matching section needs to be cut ?
- (A) 150Ω
- (B) 300Ω
- (C) 22500Ω
- (D) 350Ω
34. Which of the following is used as electronic switch and attenuator ?
- (A) Gunn diode
- (B) PN diode
- (C) GaAs FET
- (D) PIN diode

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35. Which of the following is known as crossed field tubes ?

- (A) Klystron
- (B) Magnetron
- (C) Gunn diode oscillators
- (D) Crystal oscillators.

36. Consider an AWGN channel with 4 kHz bandwidth and the noise power spectral density $\eta/2 = 10^{-12}$ W/Hz. The signal power required at the receiver is 0.1 mW. The capacity of the channel is :

- (A) 100.2 kbps
- (B) 54.44 kbps
- (C) 26.81 kbps
- (D) 50 kbps

37. A signal $x(t)$ and its Hilbert transform $\hat{x}(t)$ have :

- (A) Same amplitude spectrum
- (B) Same phase spectrum
- (C) Same amplitude but different phase spectrum
- (D) Different amplitude and phase spectrum

38. An FM signal with a modulation index β is passed through a frequency tripler. The wave in the output of the tripler will have a modulation index of :

- (A) β
- (B) $\beta/3$
- (C) 3β
- (D) 9β

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39. Two amplifiers A and B are to be connected in cascade. Amplifier A has a noise factor of 1.5 and a gain of 10 dB while amplifier B has noise figure of 3 dB with a gain of 15 dB. Which statement is *true* ?
- (A) Connecting amplifier A followed by amplifier B shall give lowest noise.
- (B) Connecting amplifier B followed by amplifier A shall give lowest noise.
- (C) Nothing can be said unless reference temperature is given
- (D) None of the above
40. A noise power of -100 dBm is available from a receiver antennae system over a 20 MHz bandwidth. Assume room temperature of 290 K. The noise temperature of the antennae is :
- (A) 300 K
- (B) 330 K
- (C) 350 K
- (D) 362 K
41. IGBT stands for :
- (A) Insulated gate bipolar transistor
- (B) Insulated gate bidirectional transistor
- (C) Inductive gate bipolar transistor
- (D) Inductive gate bidirectional transistor
42. Speed of a DC motor can be controlled by adjusting :
- (A) Frequency of its ac input
- (B) Current through its coil
- (C) Phase angle of an SCR
- (D) Using an LCD

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43. In GaAs is used a detector in optical communication because of :
- (A) Easy to form PN junction
 - (B) Direct band gap semiconductor
 - (C) Cost factor as compared silicon
 - (D) Good response in IR
44. Photomultiplier tube is *not* used in optical fiber communication because :
- (A) Physical compatibility
 - (B) Low detection speed
 - (C) Quantum efficiency is low
 - (D) Low gain
45. Monomode step index optical fiber is best suited for the following application :
- (A) Medical endoscopic application
 - (B) Local area networks
 - (C) Intercontinental communication
 - (D) High power application
46. An LVDT is used to measure displacement. The LVDT feeds a voltmeter of 0-5 V range through a 250 gain amplifier. For a displacement 0.5 mm the output of LVDT is 2 mV. The sensitivity of instrument is :
- (A) 0.1 V/mm
 - (B) 0.5 V/mm
 - (C) 1 V/mm
 - (D) 5 V/mm
47. In a C.R.O. the fly back action of spot on the screen is governed by :
- (A) Sweep time (T_S)
 - (B) Retrace time (T_R)
 - (C) Both sweep time (T_S) and retrace time (T_R)
 - (D) Independent of both T_S and T_R .

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48. If a pressure gauge of range 0-10 bar has a quoted inaccuracy of $\pm 1.0\%$ of full scale reading, then it means :

- (A) Minimum expected error in any reading is 0.1 bar
- (B) Maximum expected error in any reading is 0.1 bar
- (C) Maximum expected error in any reading is 1 bar
- (D) Minimum expected error in any reading is 1 bar.

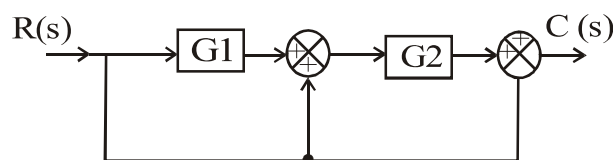
49. A controller has the following properties :

- (1) It reduces the steady state error
- (2) It increases the damping factor
- (3) Natural frequency remains the same
- (4) Settling time decreases

Which of the following controller has the above characteristics ?

- (A) Proportional
- (B) Proportional Integral
- (C) Proportional Derivative
- (D) Proportional Integral Derivative

50. For the system in the given figure the transfer function $C(s)/R(s)$ is



- (A) $G_1 + G_2 + 1$
- (B) $G_1 G_2 + 1$
- (C) $G_1 G_2 + G_2 + 1$
- (D) $G_1 G_2 + G_1 + 1$

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