



# राष्ट्रीय प्रौद्योगिकी संस्थान दिल्ली

## NATIONAL INSTITUTE OF TECHNOLOGY DELHI

(शिक्षा मंत्रालय, भारत सरकार के अधीन एक स्वायत्त संस्थान)

(An autonomous Institute under the aegis of Ministry of Education (Shiksha Mantralaya), Govt. of India)

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**PAPER-I EXAMINATION**  
**DATE: 16.06.2023 (FRIDAY)**

### **QUESTION PAPER FOR THE POST OF TECHNICIAN (ECE)** **(PAY LEVEL – 3)**

Maximum Marks: 75

Time: 02 Hour

Name of Candidate: \_\_\_\_\_ Roll No: \_\_\_\_\_

#### **INSTRUCTIONS TO CANDIDATES**

1. This question paper has 75 questions (General Section: 25 and Post Related Section: 50). Each question carries one mark. There are four choices for answer (A, B, C, D) to each question. Choose the correct answer (one only) for each question and write the answer in the space provided against each question.
2. Candidate must write Name, Roll No. and sign on each page of this booklet.
3. The candidate should check that the booklet does not have any unprinted or torn or missing pages or questions etc. If so, get it replaced with another question paper, before question paper starts.
4. One (1) mark will be awarded for each correct answer. There will be no negative marking.
5. Return the Question Paper cum Answer Sheet to the invigilator after the examination is over.
6. **Mobile, Electronic Watch** and other **Electronic Gadgets** are prohibited in the examination.
7. There should not be any cutting or overwriting in the Answer.
8. Use of Unfair Means in Examination will lead to cancellation of candidature.

Signature of the candidate

Signature of the Invigilator

#### **FOR OFFICE USE**

Paper	Max. Marks	Marks Obtained
General	25	
Post Related	50	

Signature of the Evaluator

**GENERAL SECTION**

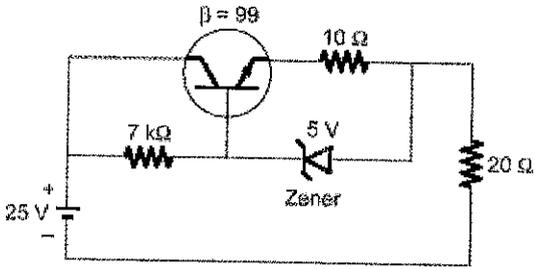
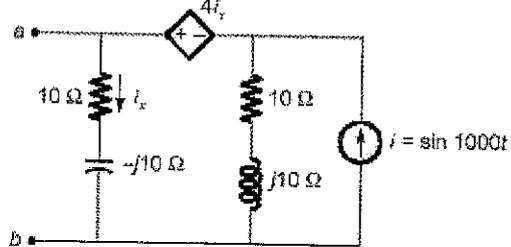
Q.No.	Question	Answer
1.	A 260 metre long train runs at a speed of 55 km/hour, how much time will it take to cross a platform 290 metre long? (a) 20 secs (b) 36 secs (c) 18 secs (d) 60 secs	B
2.	A cistern can be filled by pipes 'A' and 'B' in 12 minutes and 16 minutes respectively. When it is full, the tank can be emptied by third pipe 'C' in 8 minutes. If all the three taps be turned on at same time, the emptied cistern will be full in (a) 20 minutes (b) 24 minutes (c) 36 minutes (d) 48 minutes	D
3.	280 oranges are divided among same number of boys and girls whose total is 50. If each boy gets 5 oranges and each girl gets 7 oranges then number of girls are (a) 30 (b) 35 (c) 15 (d) 20	C
4.	If $28\sqrt{x} + 1426 = \frac{3}{4}$ of 2984, then value of 'x' will be (a) 659 (b) 694 (c) 841 (d) 859	C
5.	By selling a bicycle for Rs. 2850, a shopkeeper gains 14%. If the profit is reduced to 8%, then selling price will be (a) Rs. 2600 (b) Rs. 2700 (c) Rs. 2800 (d) Rs. 3000	B
6.	The value of $\frac{0.1 \times 0.1 \times 0.1 + 0.02 \times 0.02 \times 0.02}{0.2 \times 0.2 \times 0.2 + 0.04 \times 0.04 \times 0.04}$ is (a) 0.0125 (b) 0.125 (c) 0.25 (d) 0.5	B
7.	When we reverse the digits of number 13, it increases by 18. How many other two digit numbers increases by 18 when their digits are reversed? (a) 5 (b) 6 (c) 7 (d) 8	B
8.	Find the missing number 1, 9, 25, 49, ?, 121 (a) 100 (b) 91 (c) 64 (d) 81	D
9.	Four words are given, out of which three are same in a certain way while the rest one is different. Find out the different word. (a) Teacher (b) Principal (c) student (d) Lecturer	C

10.	<p>If 'DUST' is called 'AIR', 'AIR' is called 'FIRE', 'FIRE' is called 'WATER', 'WATER' is called 'COLOUR', 'COLOUR' is called 'RAIN', 'RAIN' is called 'DUST'. Where do Fish live?</p> <p>(a) DUST (b) FIRE (c) COLOUR (d) WATER</p>	C									
11.	<p>A pineapple costs Rs 7 each. A watermelon costs Rs 5 each. Ram spend Rs. 38 on these fruits. The number of pineapples purchased is</p> <p>(a) 2 (b) 3 (c) 4 (d) data in adequate.</p>	C									
12.	<p>Arrange the words given below in a meaningful sequence. 1. leaf 2. Fruit 3. Stem 4. Root 5 flower</p> <p>(a) 3,4,5,1,2 (b) 4,3,1,5,2 (c) 4,1,3,5,2 (d) 4,3,1,2,5</p>	B									
13.	<p>Find the missing character</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tbody> <tr> <td>G</td> <td>B</td> <td>C</td> </tr> <tr> <td>H</td> <td>F</td> <td>H</td> </tr> <tr> <td>A</td> <td>D</td> <td>?</td> </tr> </tbody> </table> <p>(a) A (b) M (c) E (d) C</p>	G	B	C	H	F	H	A	D	?	C
G	B	C									
H	F	H									
A	D	?									
14.	<p>Change the voice of given sentence, <b>'We must respect the elders'.</b></p> <p>(a) The elders deserve respect from us. (b) The elders must be respected. (c) The elders must respected. (d) Respect the elders we must.</p>	B									
15.	<p>In the given sentence identify the part which has the error. <b>'The captain along with his team / are practicing very hard / for the / forth coming matches'.</b></p> <p>(a) captain along with his team. (b) are practicing very hard (c) for the (d) forth coming matches</p>	B									
16.	<p>Choose the one which can be substituted for the given sentence. <b>'A paper written by hand'</b></p> <p>(a) Handicraft (b) Manuscript (c) Handiwork (d) Thesis</p>	B									
17.	<p>Correct the given sentence by correcting the underline words. <b>'Technology <u>must use to feed</u> the forces of change'</b></p> <p>(a) must be used to feed (b) must have been using to feed (c) must use having fed (d) must be using to feed</p>	A									

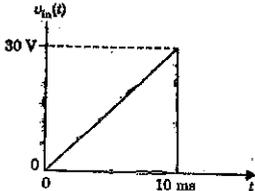
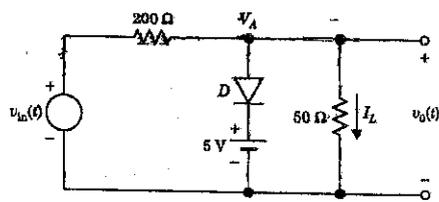
18.	Choose the option which best expresses the meaning of the given idioms/ phrase. <b>'To put one's hand to plough.'</b> (a) To take up agricultural forming. (b) To take a difficult task (c) To get entangled into unnecessary things (d) Take interest in technical work	B
19.	Fill the suitable word in the blank. <b>'In the writing of an apology letter, concentrate on _____.'</b> (a) problem (b) compensation (c) rectification of problem (d) words	C
20.	As per CPCB data, which place was the most polluted place in India in 2022? (a) Mumbai (b) New Delhi (c) Varanasi (d) Bengaluru	B
21.	Which among the following is a scheme that is aimed at the development of girl child in the country? (a) Vidya Laxmi scheme (b) Pradhan Mantri Shishu Vikas Yojna (c) Pradhan Mantri Sukanya Samridhi yojna (d) Pradhan Mantri Balika Suraksha yojana	C
22.	HIRAKUD HYDEL POWER station is located on which river? (a) CHAMBAL (b) GANDAK (c) MAHANADI (d) SONBHADRA	C
23.	Union Cabinet has amended which bill to grant retrospective recognition to central / state universities by conducting teacher education courses? (a) National Council for Teacher Education Act 1993. (b) National Teacher Accreditation Act 1993. (c) National Teacher Eligibility Act 1993. (d) None of the above.	A
24.	Who is the Constitutional Head of the State Government? (a) Chief minister of the state (b) High court judge (c) Governor (d) Prime minister	C
25.	Who among the following started the newspaper 'BANDE MATRAM' ? (a) Annie Besant (b) Gopal Ganesh Agarkar (c) Bal Gangadhar Tilak (d) Bipin Chandra Pal	D

**POST RELATED SECTION**

**QUESTION PAPER FOR THE POST OF TECHNICIAN (ECE)  
(PAY LEVEL 03)**

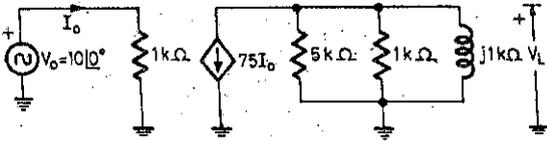
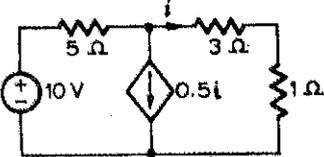
Q. No.	Question	Answer
1.	<p>The Zener diode in circuit has a breakdown voltage of 5 V. The current gain <math>\beta</math> of the transistor in the active region is 99. Ignore base-emitter voltage drop <math>V_{BE}</math>. The current through the <math>20 \Omega</math> resistance in milli amperes is .....</p>  <p>A. 300 B. 250 C. 275 D. 350</p>	B
2.	<p>For the circuit shown, if <math>I = \sin 1000t</math>, the instantaneous value of the Thevenin's equivalent voltage (in Volts) across the terminals a-b at time = 5 ms is .....</p>  <p>A. - 10.98 B. 10.98 C. - 11.98 D. 11.98</p>	C
3.	<p>A resistor is color-coded with four bands, the first one being brown, second black, third red, and fourth gold. The resistor connects to a 10 V source. Find the current flowing through the resistor.</p> <p>A. 1 mA B. 10 mA C. 100 mA D. 1 A</p>	B
4.	<p>Two parallel resistors both having their values 28 ohms are connected in parallel. The overall current provided by the 28 V source is .....</p> <p>A. 1 A B. 2 A C. 4 A D. 8 A</p>	B
5.	<p>What is the formula for calculating the unknown resistance in a Wheatstone bridge?</p> <p>A. <math>R = R1 \times R2 \div (R3 \times R4)</math> B. <math>R = R1 + R2 + R3 + R4</math> C. <math>R = R1 - R2 + R3 - R4</math> D. <math>R = R1 \times R2 + R3 \times R4</math></p>	A

6.	Which of the following is not an application of a Wheatstone bridge? A. Strain measurement B. Humidity sensing C. Pressure sensing D. Power factor correction	D
7.	To measure an A.C. voltage by using an A.C. potentiometer, it is desirable that the supply for the potentiometer is taken ..... A. from a source which is not the-same as the unknown voltage B. from a battery C. from the same source as the-unknown voltage D. any of the above	C
8.	The number of bits required to address a 4K memory is ..... A. 6 B. 8 C. 12 D. 16	C
9.	CPU scheduling is the basis of ..... A. multiprogramming O.S. B. large memory sized system C. multiprocessor system D. None of the above	A
10.	Which one of the following is not real time operating system? A. RT Linux B. Palm O.S. C. QNX D. Vx works	B
11.	Which of these software application was not part of the first version of Microsoft office? A. paint B. power point C. MS word D. outlook	D
12.	What is maximum zoom percentage in MS power point? A. 400% B. 300% C. 200% D. 100%	A
13.	Which of these refer to the power point view used for displaying only the text (title and bullets)? A. slide shorter show B. slide view C. outline view D. notes page view	C
14.	Search engine which takes input from user and simultaneously send out queries to third party search engine for result is ..... A. advance search engine B. meta search engine C. search tool D. Boolean search engine	B
15.	LEDs constructed using GaAs emits light in ..... A. Orange region B. Yellow region C. Infrared region D. Red visible region	C
16.	In a certain copper conductor, the current density is $2.4 \text{ A/mm}^2$ and electron density is $5 \times 10^{28}$ free electrons per $\text{m}^3$ of the copper. Determine the drift velocity of the electrons. A. $0.3 \times 10^{-3} \text{ m/s}$ B. $0.3 \times 10^{-5} \text{ m/s}$ C. $0.2 \times 10^{-3} \text{ m/s}$ D. $0.2 \times 10^{-5} \text{ m/s}$	A

17.	To make n-type extrinsic material which type of dopant material may be used? A. Arsenic C. Gallium B. Boron D. Indium	A
18.	A centre-tapped full wave rectifier has $R_L = 1 \text{ k}\Omega$ . Each diode has a forward bias dynamic resistance $r_d = 10 \Omega$ . The voltage across half the secondary winding is $220 \sin 314t$ . Find DC value of current. A. 1.386 A C. 0.1836 A B. 0.1386 A D. 0.386 A	B
19.	A conventional Zener voltage regulator has zener diode of 5 V, $R_S = 4.75 \Omega$ , $7.5 \text{ V} < V_S < 10 \text{ V}$ and $50 \text{ mA} \leq I_Z \leq 1.0 \text{ A}$ . Find $I_{L\text{max}}$ . A. 526.3 mA C. 423.6 mA B. 47.63 mA D. 476.3 mA	D
20.	Determine output voltage, $v_o(t)$ for the circuit shown below and assume the diode is ideal.  	C
21.	A transistor is connected in CE configuration having $R_C = 1 \text{ k}\Omega$ , $R_B = 1 \text{ k}\Omega$ , $V_{CC} = 10 \text{ V}$ , $V_{in} = 5 \text{ V}$ , $V_{BE} = 0.8 \text{ V}$ and $V_{CE,\text{sat}} = 0.2 \text{ V}$ . Assuming $\beta = 50$ , obtain $I_{B,\text{min}}$ . A. 0.619 mA C. 0.296 mA B. 0.916 mA D. 0.196 mA	D
22.	What is the waveform of the time base signal used in a CRO? A. square C. saw tooth B. sinusoidal D. triangular	C
23.	DSO works in ..... modes of operation? A. two C. four B. three D. five	B
24.	The signal generator generally used in the laboratories is ..... oscillator. A. crystal C. phase shift B. hartley D. wein bridge	D
25.	Modulation level can be adjusted in R.F signal generator upto ..... A. 80% C. 95% B. 90% D. 100%	C
26.	A galvanometer in series with a high resistance is called ..... A. an ammeter B. a voltmeter C. a watt meter D. none of the above	B

27.	The sensitivity of a voltmeter which uses a 100 $\mu$ A meter movement is ..... A. 1 k $\Omega$ /V C. 5 k $\Omega$ /V B. 10 k $\Omega$ /V D. 20 k $\Omega$ /V	B
28.	When an ammeter is inserted in the circuit, the circuit current will ..... A. increase B. decrease C. remain same D. none of the above	B
29.	According to standard classification spectrum of frequency used in Radio communication, what is the carrier frequency range for Very High Frequency (VHF) class? A. 30 – 300 MHz C. 300 – 3000 kHz B. 10 – 30 kHz D. 3000 – 30000 MHz	A
30.	For proper communication, the noise figure of a practical receiver should be ..... A. large B. small C. infinite D. none of the above	B
31.	A sinusoidal carrier voltage of amplitude 100 volts is amplitude modulated by a sinusoidal voltage of frequency 20 MHz resulting in maximum modulated carrier amplitude of 120 volts. Calculate the modulation index ( $m_a$ ). A. 0.01 C. 0.2 B. 0.32 D. 0.02	C
32.	In linear diode detector using capacitor filter, as the modulation index increases the maximum permissible value of time constant RC of the load circuit ..... A. remains unaltered C. increases B. will become zero D. decreases	D
33.	The pre-emphasis circuit in FM transmitter emphasises the ..... A. high frequency terms C. low & middle frequency terms B. low frequency terms D. middle frequency terms	A
34.	Calculate the field strength at 30 km away from a transmitting station of 25 kW power. A. 4.796 mV/m C. 43.96 mV/m B. 47.96 mV/m D. 49.76 mV/m	B
35.	The information source of a digital communication system can be ..... A. packetized C. packetized and continuous B. continuous D. none of the above	C
36.	The equivalent HEX code of the Gray code (110011) <sub>gray</sub> is ..... A. (22) <sub>HEX</sub> C. (23) <sub>HEX</sub> B. (33) <sub>HEX</sub> D. (34) <sub>HEX</sub>	A



45.	<p>Determine <math>V_L</math> in the circuit shown below using nodal analysis.</p>  <p>A. <math>430\angle -140.2^\circ</math> V                      B. <math>480\angle -140.2^\circ</math> V  C. <math>480\angle -148.2^\circ</math> V                      D. <math>430\angle -148.2^\circ</math> V</p>	B
46.	<p>The Thevenin's equivalent voltage and Thevenon's equivalent impedance of an AC circuit are <math>40\angle 30^\circ</math> volts and <math>10\angle 30^\circ \Omega</math> respectively. Determine the Norton equivalent circuit parameters (<math>I_{NORT}</math>, <math>Z_{NORT}</math>).</p> <p>A. <math>8\angle 0^\circ</math> A, <math>10\angle 20^\circ \Omega</math>                      B. <math>4\angle 0^\circ</math> A, <math>10\angle 20^\circ \Omega</math>  C. <math>8\angle 0^\circ</math> A, <math>10\angle 30^\circ \Omega</math>                      D. <math>4\angle 0^\circ</math> A, <math>10\angle 30^\circ \Omega</math></p>	D
47.	<p>Find the current in <math>1 \Omega</math> resistor in circuit given below using Norton's theorem.</p>  <p>A. 0.66 A    B. 0.76 A  C. 0.86 A    D. 0.96 A</p>	C
48.	<p>In circuit analysis, if a star network has all resistances equal to R, its equivalent delta has all resistances equal to .....</p> <p>A. <math>R/3</math>    B. <math>3R</math>  C. <math>0.3R</math>    D. <math>3/R</math></p>	B
49.	<p>The voltage source in a DC circuit will deliver maximum power to the resistive load when load resistance is ..... source resistance.</p> <p>A. less than  B. greater than  C. equal to  D. none of the above</p>	C
50.	<p>In a circuit during circuit analysis, if an emf E is applied at the input, <math>E = V_1</math>, and the output is shorted, <math>V_2 = 0</math>, we see that <math>I_2 = Y_{21}E</math>. If we apply the same voltage E to the output, and short the input, we have <math>I_1 = Y_{12}E</math>. Therefore, the network is .....</p> <p>A. reciprocal  B. non-reciprocal  C. neutral  D. all of the above</p>	A