

USN IV  
**NMAM INSTITUTE OF TECHNOLOGY, NITTE**  
 Off-Campus Centre of Nitte (Deemed to be University)  
 First Semester B.Tech (CBCS) Degree Examinations

December 2023

EC1001-1 – BASIC ELECTRONICS  
 (For AI&DS, AI&ML, CB, CCE, CSE, ISE, R&AI)

Duration: 3 Hours

Note:

Part – A: Multiple Choice Questions: Answer all Twenty questions in the OMR Sheet provided. Each question carries equal marks.

Part – B: Descriptive Answer Questions: Answer Five full questions choosing Two full questions from Unit – I & Unit – II each and One full question from Unit – III.

Max. Marks: 100

20 Marks

**PART - A: MULTIPLE CHOICE QUESTIONS**

1. The reverse saturation current is more in \_\_\_\_\_ diode
  - A) Silicon diode
  - C) Zener diode
  - B) Germanium diode
  - D) Tunnel diode
2. A rectifier is used to convert
  - A) DC to AC
  - C) DC to DC
  - B) AC to DC
  - D) AC to AC
3. The maximum efficiency of a half wave rectifier circuit is
  - A) 38.2%
  - C) 53.5%
  - B) 40.6%
  - D) 100 %
4. A bridge rectifier circuit is supplied through the transformer secondary voltage of  $100 \sin \omega t$  volts. The value of  $V_m$  is
  - A) 50 volts
  - C) 100 volts
  - B) 70.7 volts
  - D) 80 volts
5. An voltage regulator designed using 14 V zener diode is supplied by a 20 volts battery. If a series resistance of  $1 \text{ k}\Omega$  is used, the current through the zener will be
  - A) 3 mA
  - C) 6 mA
  - B) 2 mA
  - D) 0 mA
6. A BJT has  $\alpha = 0.99$ , the base current is  $100\mu\text{A}$ . The value of collector current will be
  - A) 9.9 mA
  - C) 10 mA
  - B) 100 mA
  - D) 5 mA
7. In a bipolar junction transistor, the collector current is controlled by
  - A) Collector voltage
  - C) Collector resistance
  - B) Emitter voltage
  - D) Base current
8. If a 2 mV input signal produces a 2 V output, what is the voltage gain?
  - A) 0.001
  - C) 0.004
  - B) 100
  - D) 1000
9. Amplifiers and oscillators are designed by operating the BJT in ..... region
  - A) Active
  - C) Cut off
  - B) Saturation
  - D) Inverted mode
10. A bipolar junction transistor is a
  - A) Voltage controlled device
  - C) Current controlled device
  - B) Resistance controlled device
  - D) Impedance controlled device
11. An ideal OPAMP has an input impedance of
  - A) zero
  - C) infinity
  - B) 1
  - D) -1
12. An OPAMP used in closed loop configuration will have
  - A) Reduced gain
  - C) Increased bandwidth
  - B) Good stability
  - D) All of the above

13. EC1001-1 A input signal of 1 volt is applied to the input of a voltage follower. The output voltage will be  
 A) 100 volts  
B) 10 volts  
C) 50 volts  
D) 1 volt
14. In a junction field effect transistors, when drain voltage equals the pinch off voltage, the drain current  
 A) Increases with increase in drain voltage  
B) Remains constant with increase in drain voltage  
C) Decreases with increase in drain voltage  
D) Fluctuates with increase in drain voltage
15. JFET is a  
 A) Two terminal device  
B) Current controlled device  
C) Choose the current statement when  $V_{GS} = 0V$  and  $V_{DS} = 0V$  in a JFET  
D) None of these
16. Current controlled device  
 A) The depletion regions around the pn junctions are equal in thickness and symmetrical  
B)  $I_D$  is maximum  
C) The depletion regions around the pn junctions are not equal in thickness  
D) No change observed
17. An FET has  
 A) High input impedance  
B) Zero input impedance  
C) Low input impedance  
D) None of the above
18. In a communication system, the noise can be generated at the  
 A) Transmitter, channel, receiver  
B) Channel, receiver  
C) Transmitter, channel  
D) Only in the channel
19. Best example for natural noise is  
 A) Rain  
B) Traffic noise  
C) Industrial noise  
D) Sound pollution
20. The speech signal frequency range is  
 A) 20 Hz to 20 kHz  
B) 30 to 34 kHz  
C) 300 Hz to 3.4 kHz  
D) 10 to 10 kHz

PART - B: DESCRIPTIVE ANSWER QUESTIONS

	Marks	BT*	CO*	PO*
1. a) For the NPN silicon transistor connected in common base configuration, sketch and explain input and output characteristics.	8	L2	2	1

## Unit - I

- b) Explain the forward and reverse characteristics of a Zener diode.

Determine the value of series resistance,  $R_s$  in the circuit shown in Figure Q1(b) below. The voltage across the zener is 14 V and the zener current is 20 mA.

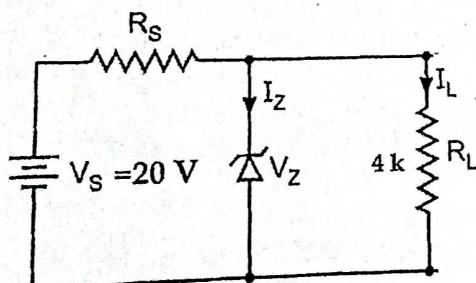


Figure Q.1(b)

8	L3	1	1
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- a) With reference to a Full Wave Bridge Rectifier:
- Draw the circuit diagram,
  - Sketch the waveforms for input AC voltage, load current, load voltage,
  - Explain the operation,
  - Derive the expression for average DC load current and average DC load voltage.
- b) With neat diagrams explain the construction, operation and drain characteristics of a N channel enhancement type MOSFET.

8	L2	1	1
8	L2	2	1

3. a) EC1001-1  
 Calculate the diode forward current  $I_F$  for the following diode circuits shown in i) Figure Q3a(i) and ii) Figure Q3a(ii).

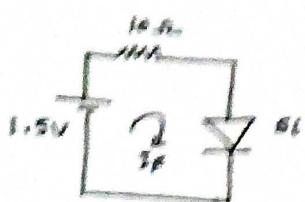


Figure Q3a(i)

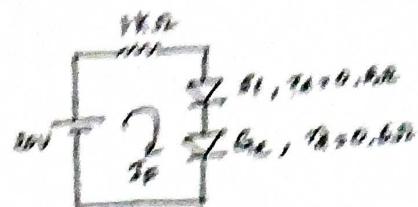


Figure Q3a(ii)

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- b) With neat diagrams explain the construction, operation and drain characteristics of a n channel JFET.

4. a) Draw the neat diagram for the Colpitt's oscillator circuit. In a Colpitt's oscillator,  $C_1 = C_2 = 400 \text{ pF}$  and  $L = 2 \text{ mH}$ . Calculate the frequency of oscillations.

- b) Explain the voltage series negative feedback with neat diagram and derive the expression for the closed loop gain.

- c) Design a non-inverting amplifier using OP-AMP with a closed loop gain of 21. Assume  $R_1 = 2 \text{ k}\Omega$ . Also draw the neat circuit diagram.

5. a) Explain the working of a Op-amp inverting amplifier with neat circuit diagram and waveforms. Also derive the expression for closed loop gain.

- b) In an oscillator circuit,  $L_1 = 10 \text{ mH}$ ,  $L_2 = 20 \text{ mH}$  and  $C = 0.01 \mu\text{F}$ . Calculate: (i) Frequency of oscillations (ii) Feedback factor

- (iii) Gain (iv) Draw the circuit diagram

- c) Explain the voltage follower circuit using Op-amp with neat circuit diagram and necessary waveforms.

6. a) Design an adder circuit using OPAMP to generate an output voltage given by  $V_o = -(4V_1 + 2V_2 + 6V_3)$ . Choose  $R_f = 10 \text{ k}\Omega$ .

- b) Explain the operation of Astable multivibrator constructed using IC 555 Timer with necessary diagrams and waveforms.

- c) In an IC 555 Timer,  $R_1 = R_2 = 7.5 \text{ k}\Omega$  and  $C = 0.1 \mu\text{F}$ . Calculate the frequency of oscillations.

6	L3	1	1
10	L2	2	1
6	L3	3	1
6	L2	4	1
4	L3	3	1
6	L2	4	1
6	L2	3	1
4	L2	4	1
6	L3	4	1
6	L3	3	1
4	L2	4	1

### Unit - III

7. a) With a neat diagram, explain the basic elements of an electronic communication system.

- b) With neat diagrams, explain the elements of embedded systems.

- c) Explain the concept of frequency reuse in cellular communication system.

6	L2	5	1
6	L2	5	1
4	L2	5	1

8. a) Discuss the types of channels used in a communication system with suitable examples.

- b) Compare the microprocessor and microcontroller.

- c) What is modulation? What are the different types of modulation schemes used commonly in a communication system? Explain briefly.

6	L2	5	1
6	L2	5	1
4	L2	5	1

BT\* Bloom's Taxonomy, L\* Level; CO\* Course Outcome; PO\* Program Outcome

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N	N	M	2	3	C	S	1	4	6
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**First Semester B.Tech (CBCS) Degree Examinations**

December 2023

**IS1101-1 – FUNDAMENTALS OF CYBER SECURITY**

(For ACT, AI&DS, AI&ML, CB, CCE, CSE, ECE, EEE, ISE, R&AI, VLSI)

Duration: 3 Hours

Max. Marks: 100

**Note:**

Part – A: Multiple Choice Questions: Answer all Twenty questions in the OMR Sheet provided. Each question carries equal marks.

Part – B: Descriptive Answer Questions: Answer Five full questions choosing Two full questions from Unit – I & Unit – II each and One full question from Unit – III.

**PART - A: MULTIPLE CHOICE QUESTIONS**

**20 Marks**

1. What does the Indian Information Technology Act (ITA-2008) aim to protect?
  - A) Only data
  - B) Only systems
  - C) Both data and systems
  - D) Neither data nor systems
2. What is the main goal of Password Sniffing?
  - A) Altering data
  - B) Financial gain
  - C) Stealing passwords
  - D) Vandalizing websites
3. Which of the following is a form of Techno-vandalism?
  - A) Email Spoofing
  - B) Website Defacement
  - C) Data Diddling
  - D) Salami Attack
4. What does Software Piracy involve?
  - A) Unauthorized copying
  - B) Stealing passwords
  - C) Defacing websites
  - D) Sending fake emails
5. \_\_\_\_\_ gets propagated through networks and technologies like SMS, Bluetooth, wireless medium, USBs and infrared to affect mobile phones.
  - A) Worms
  - B) Antivirus
  - C) Malware
  - D) Multimedia files
6. Which of the following is not a security issue for PDAs?
  - A) Password theft
  - B) Reverse engineering
  - C) Data theft
  - D) Wireless vulnerability
7. Hackers cannot do which of the following after compromising your phone?
  - A) Steal your information
  - B) Rob your e-money
  - C) Spying
  - D) Shoulder surfing
8. Which of the following is not an OS for mobile?
  - A) Palm
  - B) Mango
  - C) Microsoft office
  - D) Android
9. \_\_\_\_\_ works in background and steals sensitive data.
  - A) Virus
  - B) Shareware
  - C) Adware
  - D) Trojan
10. Trojans do not do one of the following. Identify that.
  - A) Deleting Data
  - B) Protecting Data
  - C) Modifying Data
  - D) Copying Data
11. A computer \_\_\_\_\_ is a malicious code which self-replicates by copying itself to other programs.
  - A) program
  - B) application
  - C) worm
  - D) virus
12. \_\_\_\_\_ gets installed & stays hidden in your computer's memory. It stays involved to the specific type of files which it infects.
  - A) Boot Sector Virus
  - B) Direct Action Virus
  - C) Multipartite Virus
  - D) Polymorphic Virus

13. In \_\_\_\_\_ some cyber-criminals redirect the legitimate users to different phishing sites and web pages via emails, IMs, ads and spyware.  
 A) Phishing  
 C) URL Redirection  
 B) MITM attack  
 D) DoS
14. Phishers often develop \_\_\_\_\_ websites for tricking users & filling their personal data.  
 A) legitimate  
 C) genuine  
 B) illegitimate  
 D) official
15. Which of the following type of data, phishers cannot steal from its target victims?  
 A) bank details  
 C) passwords  
 B) phone number  
 D) apps installed in the mobile
16. \_\_\_\_\_ type of phishing became very popular as if it has been sent from a legitimate source with a legitimate link to its official website.  
 A) Algo-based phishing  
 C) Domain Phishing  
 B) Email-based phishing  
 D) Vishing
17. \_\_\_\_\_ is hiding of data within data, where we can hide images, text, and other messages within images, videos, music or recording files.  
 A) Cryptography  
 C) Tomography  
 B) Steganography  
 D) Chorography
18. The \_\_\_\_\_ model is 7-layer architecture where each layer is having some specific functionality to perform.  
 A) TCP/IP  
 C) Cloud  
 B) OIS  
 D) OSI
19. \_\_\_\_\_ is a popular command-line packet analyser.  
 A) Wireshark  
 C) Snort  
 B) Metasploit  
 D) Tcpdump
20. The \_\_\_\_\_ is categorized as an unknown segment of the Deep Web which has been purposely kept hidden & is inaccessible using standard web browsers.  
 A) Dark web  
 C) Haunted web  
 B) World Wide Web  
 D) Surface web

#### PART - B: DESCRIPTIVE ANSWER QUESTIONS.

##### Unit - I

		Marks	BT*	CO*	PO*
1. a)	What is cyber stalking? How cyber stalking works?	8	L*1	1	1
b)	Discuss the types and techniques of Credit Card Frauds.	8	L1	1	1
2. a)	What is Reconnaissance? Discuss passive and active Reconnaissance.	8	L1	1	1
b)	Define the terms: Mishing, Vishing and Smishing. Explain how Vishing is carried out.	8	L1	2	1
3. a)	What is social engineering? Briefly explain the two types of social engineering.	8	L1	1	1
b)	List and explain any 5 Bluetooth hacking tools. Explain Bluejacking and Bluesnarfing.	8	L1	2	1

##### Unit - II

4. a)	What are Proxy servers and Anonymizers? List the purposes of a Proxy server.	8	L1	3	1
b)	Explain the following Phishing methods: i) Dragnet ii) Lobsterpot.	8	L1	4	1
5. a)	What is DoS attack? What can it do? Discuss the classification of DoS attacks.	8	L1	3	1
b)	List and explain any five ID theft counter measures.	8	L1	4	1

- IS1101-1  
 6. a) Write a note each of the following:  
 i) Boot Sector viruses  
 ii) Program Viruses  
 iii) Stealth Viruses  
 iv) Polymorphic viruses.  
 b) Explain any four types of Identity Theft.

8	L1	3	1
8	L1	4	1

### Unit – III

7. a) List forensics life cycle phases. Explain the first two phases.  
 b) What is chain of custody? Why is it used? What are the documents that chain of custody must include?

8	L1	5	1
8	L1	5	1

8. a) List any six security issues that are associated with social networking sites. Give any 3 examples of security measures used by social networking sites.  
 b) What does testify in digital forensics involve? When can a witness testify evidence? What are the principles applied to maintain the integrity of digital evidence?

8	L1	5	1
8	L1	5	1

BT\* Bloom's Taxonomy, L\* Level; CO\* Course Outcome; PO\* Program Outcome  
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December 2023

**PH1004-1 – QUANTUM COMPUTING AND MODERN PHYSICS**  
(For AD, AM, CB, CC, CS, IS, RI)

Duration: 3 Hours

Max. Marks: 100

**Note:**  
Part – A: Multiple Choice Questions: Answer all Twenty questions in the OMR Sheet provided. Each question carries equal marks.

Part – B: Descriptive Answer Questions: Answer Five full questions choosing Two full questions from Unit – I & Unit – II each and One full question from Unit – III.

**PART - A: MULTIPLE CHOICE QUESTIONS**

**20 Marks**

1. What is a vector space?
 

A) A space consisting of only vectors	B) A set of vectors closed under addition and scalar multiplication
C) A space that includes both vectors and scalars	D) A space that is always three-dimensional
2. In a finite-dimensional vector space, the number of linearly independent vectors a basis can have is
 

A) 0	B) 1
C) The dimension of the vector space	D) The size of the vector space
3. Moore's Law originally stated that the number of transistors on a microchip would double approximately every:
 

A) 6 months	B) 1 year
C) 2 years	D) 3 years
4. What is the fundamental unit of information in quantum computing?
 

A) Bit	B) Byte
C) Qubit	D) Quantum gate
5. Which property allows qubits to represent multiple states simultaneously in quantum computing?
 

A) Superposition	B) Entanglement
C) Interference	D) Tunneling
6. The eigenvalue of a Hermitian matrix is
 

A) Complex conjugate	B) Real
C) Both real and complex	D) Complex
7. Quantum Not Gate is equivalent to
 

A) Pauli-X gate	B) Pauli-Y gate
C) Pauli-Z gate	D) Phase gate
8. Which is not a quantum gate
 

A) S-gate	B) T-gate
C) Hadamard gate	D) NAND gate
9. Which of the following is an example of an intrinsic semiconductor?
 

A) Silicon with added boron impurities	B) Silicon with added phosphorus impurities
C) Pure, undoped silicon	D) Silicon with added arsenic impurities
10. What is the primary charge carrier in an N-type semiconductor?
 

A) Protons	B) Electrons
C) Holes	D) Neutrons
11. When a P-type semiconductor and an N-type semiconductor are joined together to form a PN junction, what happens to the majority carriers near the junction?
 

A) They all disappear.	B) They combine and recombine.
C) They diffuse across the junction.	D) They become immobile.

PH1004-1

12. What is the primary function of a solar cell?  
 A) To store electrical energy  
 C) To generate heat from sunlight
13. In the Fermi-Dirac distribution function, as temperature increases:  
 A) The distribution becomes narrower  
 C) The distribution remains unchanged
14. The Meissner effect in superconductors refers to the phenomenon where a superconductor:  
 A) Generates a strong magnetic field  
 C) Allows magnetic field lines to pass through it easily
15. Superconductivity is a phenomenon where certain materials exhibit:  
 A) Perfect electrical conductivity at all temperatures  
 C) Enhanced electrical resistance at low temperatures
16. Type I superconductors exhibit a sudden transition to the superconducting state at the critical temperature and:  
 A) Do not allow magnetic fields to penetrate  
 C) Completely retain their normal state properties
17. A laser beam is characterized by its coherence. Coherence refers to:  
 A) The intense brightness of the laser beam  
 C) The uniformity of the laser beam's color
18. Laser active material in Nd: YAG laser is  
 A) Neodymium  
 C) Aluminum
19. Which type of optical fiber has a core with a refractive index that gradually decreases from the center outward?  
 A) Multi-mode fiber  
 C) Single-mode fiber
20. Which wavelength range of light is commonly used for telecommunications over optical fibers?  
 A) Ultraviolet  
 C) Infrared

PART - B: DESCRIPTIVE ANSWER QUESTIONS

## Unit - I

		Marks	BT*	CO*	PO*
1.	a) Write any four differences between classical and quantum computing. b) Explain Pauli matrices and the interaction of Pauli matrices on $ 0\rangle$ and $ 1\rangle$ state. c) $ \psi\rangle = A(2 0\rangle + 3i 1\rangle)$ find $\langle\psi \psi\rangle$ .	4 8 4	L2 L2 L3	1 1 1	1,2 1,2 1,2
2.	a) What is Linear vector space? Explain its axioms. b) Explain S gate. How does it operate on qubits? Write the truth table for it. c) Check if the following matrix is unitary or not $A = \frac{1}{\sqrt{3}} \begin{bmatrix} 1 & 1+i \\ 1-i & 1 \end{bmatrix}$	6 6 4	L1 L2 L3	1 1 1	1,2 1,2 1,2
3.	a) Explain Quantum superposition, Orthogonality, and Orthonormality of quantum states b) Write a note on Bloch Sphere with a diagram. c) Verify, if $A = \begin{bmatrix} 1 & 4+3i \\ 4-3i & 5 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 4-3i \\ 4-3i & 5 \end{bmatrix}$ are Hermitian or not.	6 6 4	L2 L2 L3	1 1 1	1,2 1,2 1,2

4.	a) Explain the probability of occupation for the energy levels $E < E_F$ and $E > E_F$ at $T=0K$ , for metals. b) From carrier concentration, deduce the expression for electrical conductivity of an extrinsic semiconductor. c) Calculate the resistivity of intrinsic germanium if the intrinsic carrier density is $2.5 \times 10^{19} \text{ m}^{-3}$ assuming electron and hole mobilities of $0.38 \text{ m}^2 \text{V}^{-1} \text{s}^{-1}$ and $0.18 \text{ m}^2 \text{V}^{-1} \text{s}^{-1}$ respectively.	6 6 4	L2 L2 L3	2 2 2	1,2 1,2 1,2
5.	a) Write a detailed note on solar cells. b) What is the Hall effect? Explain the generation of the Hall field in the semiconductor. Obtain expressions for carrier concentration and Hall coefficient. c) Calculate the probability of occupation of an electron occupying an energy level 0.02 eV above the Fermi level at 200 K.	4 8 4	L2 L2 L3	2 2 2	1,2 1,2 1,2
6.	a) What is superconductivity? Explain the important characteristic properties of superconductors. b) Explain the magnetic behaviour of Type-I and Type-II superconductors. c) The critical temperature and critical magnetic field for superconducting lead are 7.2 K and 800 gauss respectively. What will be the temperature up to which lead will be in superconducting state in a magnetic field of 400 gauss?	6 6 4	L2 L2 L3	3 3 3	1,2 1,2 1,2

## Unit - III

7.	a) Differentiate between spontaneous and stimulated emission. Which of them is important in laser action and why? b) Explain the construction and working of a Nd-YAG laser with neat diagrams. c) Find the ratio of population of two energy states, the transition between which is responsible for the emission of photons of wavelength 694.3nm at temperature 300 K.	4 8 4	L2 L2 L4	4 4 4	1,2 1,2 1,2
8.	a) What is an optical fiber? Derive an expression for the numerical aperture of an optical fiber. b) Explain the different types of multi-mode optical fibers with suitable diagrams. c) Calculate the numerical aperture and acceptance angle of an optical fiber with core and cladding refractive indices of 1.45 and 1.40 respectively.	6 6 4	L3 L2 L4	5 5 5	1,2 1,2 1,2

BT\* Bloom's Taxonomy, L\* Level; CO\* Course Outcome; PO\* Program Outcome  
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December 2023

**MA1002-1- CALCULUS AND DIFFERENTIAL EQUATIONS**  
 (Common to AD / AM / CB / CC / CS / IS / RI)

Duration: 3 Hours

Max. Marks: 100

**Note:**  
Part – A: Multiple Choice Questions: Answer all Twenty questions in the OMR Sheet provided. Each question carries equal marks.

Part – B: Descriptive Answer Questions: Answer Five full questions choosing Two full questions from Unit – I & Unit – II each and One full question from Unit – III.

**PART - A: MULTIPLE CHOICE QUESTIONS**

**20 Marks**

1. The cartesian form of the polar coordinate  $\left(3, \frac{\pi}{2}\right)$  is:  
 A)  $(0,3)$       B)  $(3,-3)$   
 C)  $(3,0)$       D)  $(-3,3)$
2. Two polar curves intersect orthogonally. Let  $\phi_1$  and  $\phi_2$  be the angles between their respective radius vector and the tangents. If the value of  $\tan \phi_1 = -\frac{2}{5}$  then the value of  $\tan \phi_2 =$   
 A)  $-\frac{5}{2}$       B)  $-\frac{2}{5}$   
 C)  $\frac{5}{2}$       D)  $\frac{2}{5}$
3. The radius of curvature of the curve  $y = e^x$  at  $x = 0$  is:  
 A) 2      B) 1  
 C)  $\sqrt{2}$       D)  $2\sqrt{2}$
4. The function  $f(x) = x(x - 2)$  satisfies the Rolle's theorem in which of the following intervals:  
 A)  $[-1,1]$       B)  $[0,2]$   
 C)  $[1,2]$       D)  $[-2,0]$
5. If  $f(x)$  is a function such that  $f_{xx} = 6xy^3$  then  $f_{xyx} =$   
 A)  $3x^2y^3$       B)  $3xy^2$   
 C)  $18xy^2$       D)  $6y^3$
6. If  $u = y^2 - xy$  then  $xu_x + yu_y =$   
 A)  $2u$       B)  $2y - x$   
 C)  $y^2 - xy$       D)  $2 - u$
7. If  $x = uv$ ,  $y = \frac{u}{v}$  then  $\frac{\partial(x,y)}{\partial(u,v)}$  is :  
 A)  $u$       B)  $-2 v/u$   
 C)  $-2 u/v$       D) 1
8. If  $z = 6x^2y^2 + 8x^2$  then  $\frac{\partial z}{\partial x}$  is :  
 A)  $6y^2 + 16x$       B)  $6x^2 + 8x^2$   
 C)  $12xy^2 + 16x$       D)  $6x^2 + 6y^2 + 8x^2$
9. If  $\vec{r} = x\hat{i} + y\hat{j} + z\hat{k}$  then  $\operatorname{div}(\vec{r})$  is :  
 A) 1      B) 3  
 C)  $\hat{i} + \hat{j} + \hat{k}$       D) 0
10. A vector field with vanishing divergence is called  
 A) an irrotational vector field  
 B) solenoidal vector field  
 C) scalar field      D) Divergent field

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 11. If  $f(x, y) = 5xy - x^2$  then Hessian of  $f$  is  
 A)  $\begin{bmatrix} 2 & 1 \\ 1 & 0 \end{bmatrix}$   
 C)  $\begin{bmatrix} 5 & 1 \\ 1 & 9 \end{bmatrix}$   
 B)  $\begin{bmatrix} -2 & 1 \\ 1 & 5 \end{bmatrix}$   
 D)  $\begin{bmatrix} -2 & 5 \\ 5 & 0 \end{bmatrix}$
12. If  $\vec{F} = 4ax\hat{i} + 8by\hat{j}$  is solenoidal then which of the following is false?  
 A)  $\nabla \cdot \vec{F} = 0$   
 C)  $a = 2b$   
 B)  $\nabla \cdot \vec{F}$  is a scalar quantity  
 D)  $a = -2b$
13. Which of the following function is not a solution of the differential equation  $\frac{dy}{dx} = y$ ?  
 A)  $y = 2e^x$   
 C)  $y = 3e^x$   
 B)  $y = e^{2x}$   
 D)  $y = e^x$
14. The partial differential equation of the expression  $z = ay + bx$ , where  $a$  and  $b$  are arbitrary constants, is:  
 A)  $z = px + qy$   
 C)  $z = p + q$   
 B)  $z = qx + py$   
 D)  $z = px - qy$
15. Which of the following equation is not a first order linear differential equation in  $y$ ?  
 A)  $\frac{dy}{dx} + x^2y = \cos^2 x$   
 C)  $\frac{dy}{dx} + x^2y^2 = \tan x$   
 B)  $\frac{dy}{dx} + y \sec^2 x = e^x$   
 D)  $\frac{dy}{dx} + y \sin^2 x = x^3$
16. Which of the following partial differential equation is not an elliptic partial differential equation?  
 A)  $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$   
 C)  $a^2 \frac{\partial^2 u}{\partial x^2} = \frac{\partial u}{\partial t}$   
 B)  $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = f(x, y)$   
 D)  $x^2 \frac{\partial^2 u}{\partial x^2} + 4y^2 \frac{\partial^2 u}{\partial t^2} = 4xy$
17. The limits of integration in the double integral  $\iint_R f(x, y) dx dy$ , where  $R$  is in the first quadrant and bounded by  $x = 0$ ,  $y = 0$ ,  $x + y = 1$  is  
 A)  $\int_{x=0}^1 \int_{y=0}^{1-x} f(x, y) dx dy$   
 C)  $\int_{y=0}^1 \int_{x=1}^y f(x, y) dx dy$   
 B)  $\int_{y=1}^2 \int_{x=0}^{1-y} f(x, y) dx dy$   
 D)  $\int_{x=0}^1 \int_{y=1}^x f(x, y) dx dy$
18. The value of integral  $\iint_D dx dy$  where  $D$  is the region above the  $x$ -axis and within a circle centered at the origin of radius 2.  
 A)  $4\pi$   
 C)  $\frac{5}{4}\pi$   
 B)  $8\pi$   
 D)  $2\pi$
19. The value of  $\int_0^a \int_0^b \int_0^c dz dy dx$  is  
 A)  $a + b + c$   
 C)  $\frac{abc}{c}$   
 B)  $\frac{ab}{c}$   
 D)  $abc$
20. For any  $m > 0$ ,  $\beta(m, 1) =$   
 A)  $\frac{1}{m}$   
 C) 0  
 B)  $m$   
 D) 1

### PART - B: DESCRIPTIVE ANSWER QUESTIONS

#### Unit - I

- |  | Marks       | BT*            | CO*         | PO          |
|--|-------------|----------------|-------------|-------------|
| 1. a) With usual notation prove that $\tan \phi = r \frac{d\theta}{dr}$ .<br>b) A thin, closed rectangular box has one edge equal to twice the other end, and a volume of $72 \text{ m}^3$ . What is the least surface area of the box?<br>c) Obtain the series expansion of the function $\sin x$ in powers of $(x - \frac{\pi}{2})$ .<br>Expand up to three non-vanishing terms. | 6<br>6<br>4 | L1<br>L2<br>L2 | 1<br>2<br>1 | 2<br>1<br>2 |
| 2. a) State and prove the Cauchy's Mean value theorem.<br>b) If $u = f(y - z, z - x, x - y)$ , show that $\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} + \frac{\partial u}{\partial z} = 0$ .   | 6<br>6      | L1<br>L2       | 1<br>2      | 1<br>1      |

c) Prove that the curves $r = a(1 + \sin \theta)$ and $r = b(1 - \sin \theta)$ intersect orthogonally.	A	4	L2	1	2
3. a) Find the radius of curvature of the cycloid: $x = a(\theta + \sin \theta)$ , $y = a(1 - \cos \theta)$ .		6	L2	1	1
b) Expand the following functions up to third degree terms: $f(x, y) = e^y \log(1 + x)$ .		6	L2	2	2
c) If $u = \frac{y}{x} + \frac{z}{x} + \frac{x}{y}$ show that $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} + z \frac{\partial u}{\partial z} = 0$ .		4	L1	2	1

**Unit - II**

4. a) If $\phi = x^2yz + 4xz^2$ , find $\vec{F} = \nabla\phi$ . Hence find $\nabla \cdot \vec{F}$ and $\nabla \times \vec{F}$ . Evaluate these at the point $(1, -1, 1)$ .	A	6	L1	3	1
b) Solve the differential equation $(4D^2 - 1)y = e^{\frac{x}{2}} + 12e^x + 4$	1	6	L2	4	1
c) Define irrotational vector field. Show that the vector $2xy\hat{i} + (x^2 + 2yz)\hat{j} + (y^2 + 1)\hat{k}$ is irrotational.	A	4	L1	3	2
5. a) Evaluate the gradient and Hessian of the function $f(x, y) = x \sin(y)$ at the point $(1, \pi/2)$ .		6	L1	3	1
b) Solve the differential equation: $(D^2 - 2D + 5)y = 10x^2 + 2x - 5$ .		6	L2	4	2
c) Form partial differential equations by eliminating the arbitrary functions: $z = f(x^2 - y^2)$ .		4	L2	4	1
6. a) Find the directional derivative of $\phi = x^2y + y^2x + yz^2 - 3$ at the point $(2, 1, 1)$ in the direction of $\hat{i} + 2\hat{j} + 2\hat{k}$ .	6	6	L2	3	2
b) Solve the P.D.E. by the method of separation of variables: $y^3 \frac{\partial z}{\partial x} + x^2 \frac{\partial z}{\partial y} = 0$ .		6	L1	4	2
c) Find the particular solution of the differential equation: $y'' - 2y' = 0$ , given that $y(0) = -3$ & $y'(0) = 2$ .		4	L1	4	1

**Unit - III**

7. a) Prove that $\beta(m, n) = \frac{\Gamma(m)\Gamma(n)}{\Gamma(m+n)}$	6	6	L2	5	2
b) Evaluate $\int_0^\infty \int_0^x x e^{-\frac{x^2}{y}} dx dy$ by changing the order of integration.		6	L2	5	1
c) Prove that $\int_0^{\pi/2} \sqrt{\sin \theta} d\theta \int_0^{\pi/2} \frac{d\theta}{\sqrt{\sin \theta}} = \pi$ .		4	L1	5	1
8. a) Find the area of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ .		6	L1	5	1
b) Evaluate the triple integral: $\int_0^1 \int_0^2 \int_1^2 x^2 yz dx dy dz$ .		6	L2	5	2
c) Evaluate integral $\int_0^\infty x^6 e^{-2x} dx$ in terms of Gamma functions		4	L1	5	2

BT\* Bloom's Taxonomy, L\* Level; CO\* Course Outcome; PO\* Program Outcome

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**NMAM INSTITUTE OF TECHNOLOGY, NITTE**  
**Off-Campus Centre of Nitte (Deemed to be University)**  
**First Semester B.Tech (CBCS) Degree Examinations**

December 2023

**CS1005-1 – INTRODUCTION TO PYTHON PROGRAMMING**  
(For AI&DS, AI&ML, CB, CCE, CSE, CV, ISE, R&AI)

Duration: 3 Hours

Max. Marks: 100

**Note:**

**Part – A: Multiple Choice Questions:** Answer all Twenty questions in the OMR Sheet provided. Each question carries equal marks.

**Part – B: Descriptive Answer Questions:** Answer Five full questions choosing Two full questions from Unit – I & Unit – II each and One full question from Unit – III.

**PART - A: MULTIPLE CHOICE QUESTIONS**

20 Marks

1. Who developed Python Programming Language?
 

A) Wick van Rossum	B) Rasmus Lerdorf
C) Guido van Rossum	D) Niene Stom
2. All keywords in Python are in \_\_\_\_\_
 

A) Capitalized	B) lower case
C) UPPER CASE	D) None of the mentioned
3. Which of the following is the truncation division operator in Python?
 

A)	B) //
C) /	D) %
4. What will be the output of the following Python function?  
`len(["hello",2, 4, 6])`

A) Error	B) 6
C) 4	D) 3
5. What is output of `print(math.pow(3, 2))`?
 

A) 9.0	B) None
C) 9	D) None of the mentioned
6. In order to store values in terms of key and value we use what core data type.
 

A) list	B) tuple
C) class	D) dictionary
7. What will be the output of the following Python code?  
`for i in range(2.0):`  
 `print(i)`

A) 0.0 1.0	B) 0 1
C) error	D) none of the mentioned
8. Suppose `t = (1, 2, 4, 3)`, which of the following is incorrect?
 

A) <code>print(t[3])</code>	B) <code>t[3] = 45</code>
C) <code>print(max(t))</code>	D) <code>print(len(t))</code>
9. \_\_\_\_\_ represents an entity in the real world with its identity and behaviour.
 

A) A method	B) An object
C) A class	D) An operator
10. Fill in the line of the following Python code for calculating the factorial of a number.  
`def fact(num):`  
 `if num == 0:`  
 `return 1`  
 `else:`  
 `return _____`

A) <code>num*fact(num-1)</code>	B) <code>(num-1)*(num-2)</code>
C) <code>num*(num-1)</code>	D) <code>fact(num)*fact(num-1)</code>

**NMAM INSTITUTE OF TECHNOLOGY, NITTE**  
Off-Campus Centre of Nitte (Deemed to be University)  
**First Semester B.Tech (CBCS) Degree Examinations**

December 2023

## **HU1001-1 – TECHNICAL ENGLISH**

(For CB, CSE, CCE, ISE, R&AI)

**Duration: 3 Hours**

Max. Marks: 100

**Note:** Part – A: Multiple Choice Questions: Answer all Twenty questions in the OMR Sheet provided. Each question carries equal marks.

**Part – B: Descriptive Answer Questions:** Answer Five full questions choosing Two full questions from Unit – I & Unit – II each and One full question from Unit – III.

## PART - A: MULTIPLE CHOICE QUESTIONS

20 Marks

1. The fall of economy was due to CoViD 19. Identify the short vowel sound for the underlined letter.  
A) /a:/ B) /i:/  
C) /ɜ:/ D) /ɔ:/

2. Carpooling is a solution to fuel conservation. Identify the short vowel sound for the underlined letter.  
A) /a:/ B) /ɜ:/  
C) /ɔ:/ D) /u:/

3. I wanted to book two tickets for the show.  
A) /ʊ/ B) /ɒ/  
C) /æ/ D) /ɪ/

4. The past tense of "finish" is  
A) /fɪnɪʃt/ B) /fɪnɪtʃ/  
C) /fɪnɪʃd/ D) /fɪnɪʃ/

5. Which among the following is not suitable in connection with business calls?  
A) Preparation before the call B) Usage of greetings  
C) Long duration of the call D) Using titles

6. Identify the odd one:  
A) miscommunication B) cross-connection  
C) network issues D) saves time

7. Gestures can be seen in \_\_\_\_\_ communication.  
A) dramatic B) spoken  
C) written D) telephonic

8. Select the appropriate expression for 'Would you mind...'  
A) Open the door for me? B) Taking a picture for us?  
C) Give me a ride home? D) Lend me your cell phone?

9. Planning a holiday can be just as \_\_\_\_\_ as going on holiday.  
A) exciting B) exited  
C) exite D) unexcited

10. The chief guest concluded his speech \_\_\_\_\_ stressing on Buddha's teachings of the importance of charity.  
A) with B) by  
C) at D) in

11. \_\_\_\_\_ poor always work hard.  
A) A B) An  
C) The D) No article

12. It is \_\_\_\_\_ to work in her team.  
A) Most possible B) Impossible  
C) Unpossible D) Possibly

13. 'Appeal to the Nation' is a speech by Dr. B.R. Ambedkar in \_\_\_\_\_  
 A) The Constituent Assembly  
 C) Joint session of the Armed Forces  
 B) Bombay High Court  
 D) London School of Economics
14. In the poem 'Telephone Conversation', repeated mention to the red colour stands for \_\_\_\_\_  
 A) racism and disturbance  
 C) red-cross  
 B) peace and love  
 D) bloodshed
15. How does the wind sleep in the poem Coromandel Fishers?  
 A) Like a child of dawn  
 C) Like a tired child  
 B) Like an angry child  
 D) Like a quite child
16. What does R.K. Narayan imply when he writes, "But for headache there would be many great embarrassments in life."  
 A) Headache creates embarrassments  
 C) Embarrassments in life create headache  
 B) Headache helps to escape from unpalatable situations  
 D) Headache and embarrassments are normal in life
17. I got up late this morning, \_\_\_\_\_ I had to take a taxi.  
 A) however  
 C) so  
 B) but  
 D) because
18. We'd better find a quick solution to this crisis \_\_\_\_\_ our customers will start to lose faith in us.  
 A) otherwise  
 C) but  
 B) infact  
 D) and
19. I wanted to stay longer \_\_\_\_\_ I was really enjoying the party.  
 A) so  
 C) because of  
 B) since  
 D) in
20. \_\_\_\_\_ scientific progress, scientists haven't been able to eradicate many diseases.  
 A) Despite  
 C) So  
 B) However  
 D) Though

**PART - B: DESCRIPTIVE ANSWER QUESTIONS**

	Unit – I	Marks	BT*	CO*	PO*
1. a)	Transcribe the words into IPA and Mark the Primary Stress (I-V) and transcribe the words in IPA into English (VI-X). V <sup>8</sup> i) doubt      ii) common      iii) number      iv) object(v) v) /'dɒktə/    vi) /'wɜːmən/    vii) /ə'bʌv/    viii) /hɪə/ b) Define word stress. State any three rules to substantiate.	04	L3	1	12
c)	Which is the most common expression for requests? Give a formal and informal situation and response for a request to pass a glass of water.	04	L1	1	12
d)	Discuss the stages of a telephone call with appropriate phrases and responses for each stage.	04	L2	2	9,11
2. a)	Transcribe the plural forms of words (I-V) and past tense forms of words (VI-X) into IPA. i) keep      ii) lab      iii) content      iv) brush v) laugh      vi) bang      vii) convict      viii) try b) List out the normal weak forms and strong forms of auxiliary. c) How is spoken communication different from written communication? d) The person the caller wants to speak to is unavailable. What would you tell the caller in each case? i) The person is speaking on his phone ii) The person is busy at the moment iii) The person is on leave iv) The person is not available right now	04	L3	01	12
		04	L1	01	12
		04	L2	02	9,11
		04	L1	02	9,11
3. a)	Transcribe the words into IPA and mark the primary stress (I-V) and transcribe the words in IPA into English (VI-X). i) develop      ii) account      iii) maintain      iv) educate v) /'spɛfəl/    vi) /'bɔːldɪŋ/    vii) /'ri:dər/    viii) /'ʌŋkəl/	04	L3	01	12

b) HU1001-1 List differences between British and American accents of the English Language. 04 L1 01 12

c) Turn into polite requests:

- i) Send me a mail on this. (To a vendor supplying raw materials at your workplace)
- ii) Buy me a pen. (To your mother)
- iii) Turn off the fan. (To your stranger in the train)
- iv) Give us some notes on this topic. (To your professor)

d) What do you mean by telephone etiquette? List out some common telephone etiquette. 04 L2 02 9,11

## **Unit - II**

- Read the passage and answer the questions that follow:

Suddenly I came out of the clouds and saw two long straight lines of lights in front of me. It was a runway! An airport! I was safe! I turned to look for my friend in the black aeroplane, but the sky was empty. There was nothing there. The black aeroplane was gone. I could not see it anywhere. I landed and was not sorry to walk away from the old Dakota near the control tower. I went and asked a woman in the control centre where I was and who the other pilot was. I wanted to say 'Thank you'.

She looked at me very strangely, and then laughed.

"Another aeroplane? Up there in this storm? No other aeroplanes were flying tonight. Yours was the only one I could see on the radar."

So, who helped me to arrive there safely without a compass or a radio, and without any more fuel in my tanks? Who was the pilot on the strange black aeroplane, flying in the storm, without lights?

### **Questions:**

- i) What did the narrator see when he came out of the clouds?
  - ii) Why did the narrator turn back?
  - iii) What did the narrator ask the woman in the control centre?
  - iv) What made the woman in the control centre look at the narrator strangely?
  - v) Find a word from the passage which means "surprise".
  - vi) Find the antonym of the word "departure" from the passage.
  - vii) Suggest a suitable title for the passage.
  - viii) Pilot was surprised to get help from an unknown source.  
(True/ False)

- b) Why does Dr. Ambedkar say that "Social democracy means a way of life which recognizes liberty, equality and fraternity as the principles of life?"
  - c) In the poem, The Coromandel Fishers, what does the speaker say about the relationship between the fishermen and the sea?

5. a) Rewrite as directed.

- i) Add appropriate preposition:**

Nagraj is acquitted of all charges.

- ii) Fill in the blanks using the right form of the words given in the brackets.**

My mother \_\_\_\_\_ (teach) in a college. She \_\_\_\_\_ (go) there daily in the morning.

- iii) Fill in the blanks with either the present simple or the present continuous form of the verb given in brackets.

The train      at 9 o'clock in the morning. (leave)

- iv) Fill in the blanks using the appropriate form of the verbs (past tense) given in brackets.

They — a new car (buy)

Mr. Henry \_\_\_\_\_ the CEO last evening (meet)

- v) Fill in the blanks with suitable articles.

Fill in the blanks with suitable articles  
There is \_\_\_\_\_ eucalyptus tree near my house.

- My daughter is M.A from Harvard University.

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b)	HU1001-1 R.K. Narayan writes that headache is essential for maintaining human relationships in working order. Discuss.	04	L2	04	2, 5, 11
c)	Comment on the use of satire and irony in the poem "Telephone Conversation".	04	L4	04	2, 5, 11
6. a)	Write a note on the stages of a short formal speech.	05	L2	03	1, 4, 7, 8, 10,12
b)	You are the Physical Education Director of your Institute. Prepare a welcome address for the annual sports day which shall be attended by the Principal, Vice Principals, staff, and students. The Deputy Superintendent of Police, Udupi District is the Chief Guest.	05	L3	04	2, 5, 11
c)	Write a Job Application for the following advertisement:  Assistant Engineer. Engineering graduates with at least five years of experience in the area of digital design can apply with resume to the HR-Manager, Growfield Star Digitals Pvt Ltd., Delhi.	06	L2	03	1, 4, 7, 8, 10,12
<b>Unit – III</b>					
7. a)	<b>Write a paragraph on the following.</b> Impact of social media	05	L3	05	2,3, 6,12
b)	<b>Refute the following statement.</b> Mobile phones should not be allowed in schools as the learning process of the students may be hindered.	05	L4	05	2,3, 6,12
c)	<b>Combine the following sentences with the Linkers given in brackets.</b> i) There were freezing temperatures. They trekked for hours. (in spite of) ii) We booked a holiday. We had very little money. (although) iii) William played cleverly. John couldn't beat him. (so... that) iv) I ate dragon fruit yesterday. I brought some for you. (since) v) Yami is fat. Yash is thin. (but) vi) I go to bed very early. My sister goes to bed very late. (whereas)	06	L2	05	2,3, 6,12
8. a)	<b>Write a paragraph on the following.</b> Meeting is a pleasure; parting is a pain.	05	L3	05	2,3, 6,12
b)	<b>Refute the following statement.</b> Driving age should be 21 because so many youngsters get into road accidents.	05	L4	05	2,3, 6,12
c)	<b>Fill in the blanks with appropriate linkers.</b> (despite, and, whereas, so, as well as, but) i) He owns a car _____ a bike. ii) _____ the rain I went for the picnic. iii) Janvi likes chocolates _____ her sister likes ice-cream iv) They played well _____ lost the match v) It was very cold _____ Yajman could not go to his hometown. vi) Varshini is intelligent _____ smart	06	L2	05	2,3, 6,12

BT\* Bloom's Taxonomy, L\* Level; CO\* Course Outcome; PO\* Program Outcome  
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