

**Bharatiya Vidya Bhavan's  
Sardar Patel College of Engineering**



(A Government Aided Autonomous Institute)  
Munshi Nagar, Andheri (West), Mumbai – 400058.

**END SEM/RE-EXAM EXAMINATION MAY/JUNE 2025-26**

Total Marks: 100  
CLASS/SEM : F.Y.B.Tech Electrical Sem.-II  
COURSE CODE: BSBTE202

Duration: 3 Hrs  
COURSE NAME : ENGINEERING PHYSICS

28/5/26

- Answer any FIVE questions out of SEVEN.
- Answers to all sub questions should be grouped together!
- Diagrams have to be drawn wherever necessary. Assume suitable data (if necessary) and state your assumptions clearly.
- Marks for each question are indicated against it. Figures to the right indicate Module no (MN), Course Outcome (CO) and Bloom's Taxonomy Level (BL) respectively.
- Marks will be given on the basis of what will be written in the paper irrespective of your intentions!

Good luck!

| Q1  | (20 mark) (4 mark each)                                                                                                                                                                                                                                                                                                                                                                                                              | MN/<br>CO | BL |
|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|----|
| a   | A microscope using suitable photons is employed to locate an electron in an atom within a distance of $0.1 \text{ \AA}$ . Evaluate the uncertainty involved in measurement of its velocity.                                                                                                                                                                                                                                          | 1         | 3  |
| b   | A proton is confined in an infinite square well of width $10 \text{ fm}$ . (The nuclear potential that binds protons and neutrons in the nucleus of an atom is often approximated by an infinite square well potential). Calculate the energy and wavelength of the photon emitted when the proton undergoes a transition from the first excited state to the ground state.                                                          | 2         | 3  |
| c   | Find the field outside a uniformly charged sphere of radius $R$ and total charge $q$ .                                                                                                                                                                                                                                                                                                                                               | 3         | 3  |
| d   | An ultrasonic beam of $1 \text{ cm}$ sent by a ship, returns from the sea bed after $2 \text{ s}$ . The velocity of ultrasonic waves in sea water is $1510 \text{ m/s}$ and $0^\circ \text{C}$ . Salinity of sea water is $2 \text{ gm/lit}$ at $T=30^\circ \text{C}$ . Calculate the depth of the sea and frequency at $30^\circ \text{C}$ .                                                                                        | 4         | 3  |
| e   | A $0.1 \text{ W}$ Ruby laser beam with an aperture of $5 \text{ mm}$ emits light and is focussed on a screen with a lens having focal length $0.2 \text{ m}$ . Calculate the area of the spread and intensity of the image.                                                                                                                                                                                                          | 5         | 3  |
| Q2. | (20 mark) (4 mark each)                                                                                                                                                                                                                                                                                                                                                                                                              |           |    |
| a   | An electron and a proton are both accelerated by the same potential difference $V=54 \text{ kV}$ . Evaluate their de-Broglie wavelengths and compare.                                                                                                                                                                                                                                                                                | 1         | 3  |
| b   | A small $0.50\text{-kg}$ cart is moving back and forth along an air track between two bumpers located $2.0 \text{ m}$ apart. We assume no friction; collisions with the bumpers are perfectly elastic so that between the bumpers, the cart maintains a constant speed of $0.75 \text{ m/s}$ . Treating the cart as a quantum particle, estimate the value of the principal quantum number that corresponds to its classical energy. | 2         | 3  |
| c   | Check if the following function is an impossible electrostatic field:<br>$\vec{v} = x^2 \hat{i} + (3xy + z^2) \hat{j} - 2z \hat{k}$                                                                                                                                                                                                                                                                                                  | 3         | 3  |
| d   | Find thicknesses of quartz plates used for producing frequencies $30 \text{ kHz}$ and $1 \text{ MHz}$ each having density $8.9 \text{ gm/cc}$ and Young's modulus $20.8 \times 10^{10} \text{ N/m}^2$ . Comment on the results.                                                                                                                                                                                                      | 4         | 3  |

|     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |   |     |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|-----|
| e.  | Calculate the intensity delivered by a laser pulse of energy $4 \times 10^{-3}$ Joule and the pulse length in time as $10^{-9}$ s, when the pulse is focused on a target to a very small radius $1.5 \times 10^{-5}$ m.                                                                                                                                                                                                                                                                                                 | 5 | 3   |
| Q3. | (20 mark)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |
| a.  | (8 mark) A golf ball has a mass of 40 gm and a speed of 45 m/s. If the speed can be measured to an accuracy of 2%. Calculate (a) de-Broglie wavelength (b) Kinetic energy (c) Uncertainty in momentum (d) Uncertainty in position of the golf ball.                                                                                                                                                                                                                                                                     | 1 | 3   |
| b.  | (6 mark) Find the natural frequency of vibrations of a quartz plate of thickness 1.8 mm. Given Young's modulus = $8 \times 10^{10}$ N/m <sup>2</sup> , density = 2650 kg/m <sup>3</sup> . Calculate the change in thickness if the same plate is used to produce ultrasonic waves of frequency 2 MHz. If the calculated natural frequency is sent down to the sea bed, calculate the depth of the sea. Given: the velocity of ultrasonic waves in sea is 1400 m/s, time required for the wave to be received is 0.65 s. | 4 | 3,4 |
| c.  | (6 mark) Explain working of a four level pumping scheme.                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 5 | 3   |
| Q4. | (20 mark)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |
| a.  | (8 mark) Describe the formation of continuous and characteristic X-rays and also plot the corresponding spectra.                                                                                                                                                                                                                                                                                                                                                                                                        | 1 | 2   |
| b.  | (6 mark) Evaluate the electric field at a distance z above the centre of a square loop of side a carrying uniform line charge density $\lambda$ .                                                                                                                                                                                                                                                                                                                                                                       | 3 | 4   |
| c.  | (6 mark) Explain working of a magnetostriction oscillator using a neat and labeled diagram.                                                                                                                                                                                                                                                                                                                                                                                                                             | 4 | 2   |
| Q5. | (20 mark)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |
| a.  | (8 mark) State the value of energy and wavefunction of a particle confined in a one dimensional box of length L, and plot the wavefunctions and probabilities. Evaluate the ground state energy (in eV) of a proton confined to a one-dimensional box the size of the uranium nucleus that has a radius of approximately 15.0 fm.                                                                                                                                                                                       | 2 | 1,2 |
| b.  | (6 mark) Explain working of an optical resonator using a three level pumping scheme.                                                                                                                                                                                                                                                                                                                                                                                                                                    | 5 | 4   |
| c.  | (6 mark) State and explain de-Broglie's hypothesis using the Davisson Germer experiment.                                                                                                                                                                                                                                                                                                                                                                                                                                | 1 | 1,2 |
| Q6. | (20 mark)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |
| a.  | (8 mark) State Maxwell's equations in vacuum and hence derive magnetic wave equations.                                                                                                                                                                                                                                                                                                                                                                                                                                  | 3 | 2   |
| b.  | (6 mark) Explain piezoelectric and inverse piezoelectric effects in detail.                                                                                                                                                                                                                                                                                                                                                                                                                                             | 4 | 2   |
| c.  | (6 mark) Derive wavefunction and energy values for a quantum mechanical free particle moving along the positive X-direction.                                                                                                                                                                                                                                                                                                                                                                                            | 2 | 3   |
| Q7. | (20 mark)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |     |
| a.  | (8 mark) Explain construction and working of a He-Ne laser in detail                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 5 | 1   |
| b.  | (6 mark) Arrive at Schrodinger's time dependent equation.                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 2 | 3   |
| c.  | (6 mark) Derive Ampere's law in differential form from its integral form.                                                                                                                                                                                                                                                                                                                                                                                                                                               | 3 | 3   |



Bharatiya Vidya Bhavan's  
**SARDAR PATEL COLLEGE OF ENGINEERING**

(Government Aided Autonomous Institute)  
Munshi Nagar, Andheri (W) Mumbai – 400058



**End Semester Examination/Re-Examination MAY/JULY 2025-26**

Program: FY-Electrical *Sum II* *MSM*

Course Code: ES-BTE201

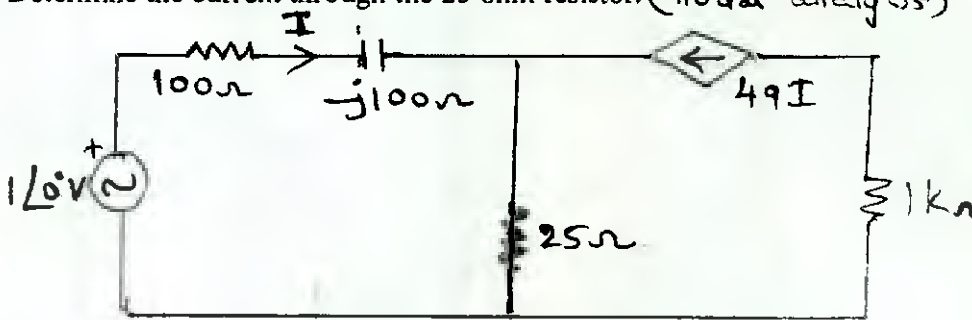
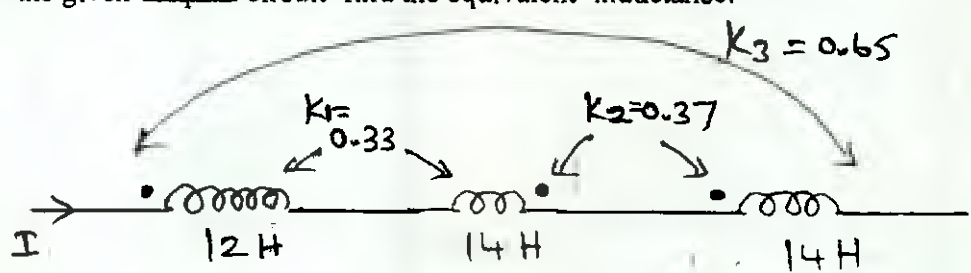
Course Name: Basic electrical Engineering II

Notes: Answer any 5 questions.

Duration: 3 hours

Maximum Points: 100

Semester: II

| Q.n<br>o. | Questions                                                                                                                                                                                  | marks | C<br>O | B<br>L | mo<br>du<br>le |
|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|--------|--------|----------------|
| 1a.       | A series resonant circuit has resistance of $1k\Omega$ and half power frequencies of 20KHz and 100KHz. Determine bandwidth, resonant frequency, inductance and capacitance of the circuit. | 5     | 2      | 3      | 3              |
| 1b.       | Determine the current through the 25 ohm resistor. (nodal analysis)<br>                                 | 5     | 1      | 3      | 1              |
| 1c.       | For the given coupled circuit find the equivalent inductance.<br>                                      | 5     | 2      | 3      | 4              |
| 1d.       | A three phase motor load has a power factor of 0.397 lagging. Two wattmeters connected to measure power show the input as 30KW. Find the readings of each wattmeter.                       | 5     | 3      | 1      | 5              |

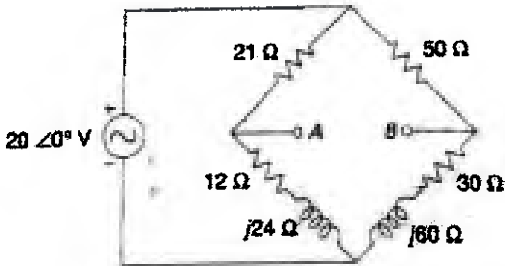
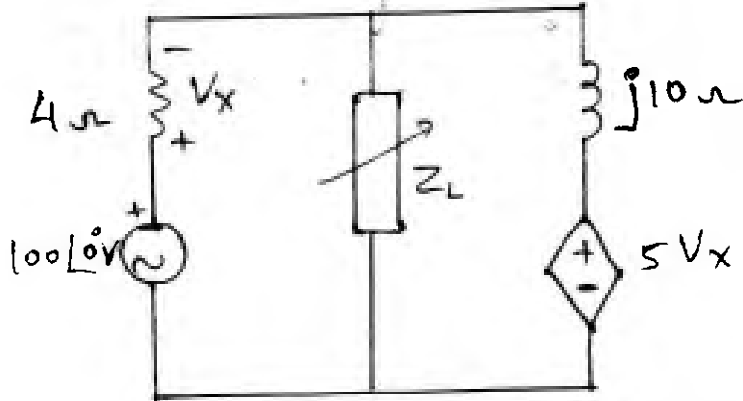


Khamrliyn Vidyut Bhavan's  
**SARDAR PATEL COLLEGE OF ENGINEERING**

(Government Aided Autonomous Institute)  
Munshi Nagar, Andheri (W) Mumbai - 400058



**End Semester Examination/Re-Examination MAY/JULY 2025-26**

|     |                                                                                                                                                                                                                                                                                                 |    |   |   |   |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|---|---|---|
| 2a. | How can power factor be determined in a three phase, 3 wire balanced star connected load with lagging power factor. Explain with neat circuit and phasor diagrams.                                                                                                                              | 10 | 3 | 3 | 5 |
| 2b. | Each phase of a delta connected load consists of a 50mH inductor in series with a parallel combination of 50Ω resistor and 50μF capacitor. The load is connected to a three phase 50V, 800 rad/sec ac supply. Find : Phase current, line current, power drawn, power factor and reactive power. | 10 | 3 | 3 | 5 |
| 3a. | Obtain Thevenin's Equivalent network for the following figure.<br>                                                                                                                                            | 10 | 1 | 3 | 2 |
| 3b. | Derive the relation between line current and phase current, line voltage and phase voltage in a Delta connected three phase system with neat circuit and phasor diagrams.                                                                                                                       | 10 | 3 | 2 | 5 |
| 4a. | Find value of $Z_L$ for maximum power transfer from the source. Also calculate the maximum power<br>                                                                                                         | 10 | 1 | 3 | 2 |

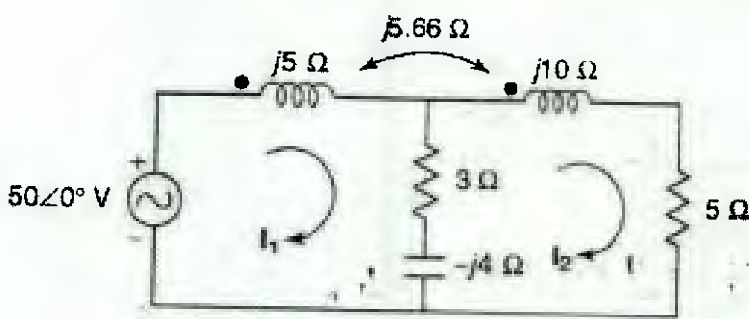
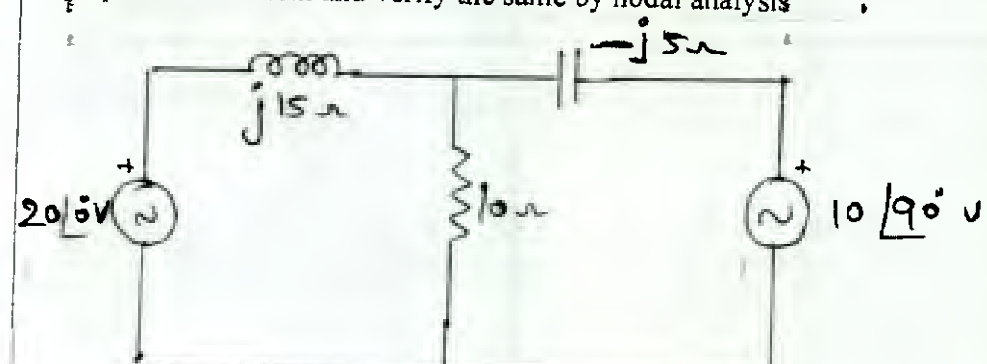
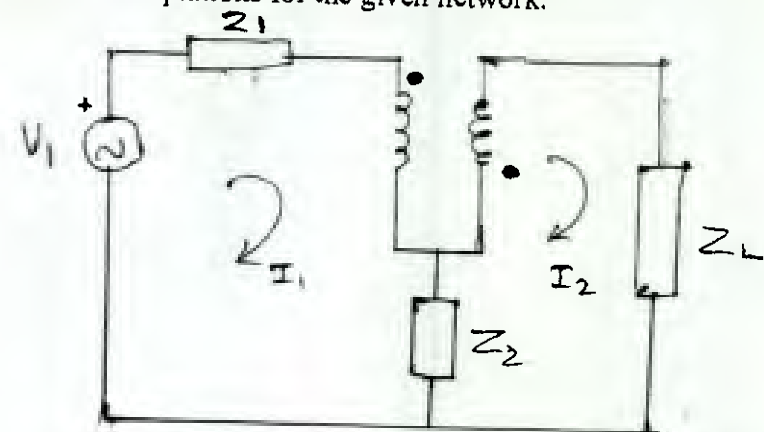


Uharaliya Vidya Bhavan's  
**SARDAR PATEL COLLEGE OF ENGINEERING**

(Government Aided Autonomous Institute)  
Munshi Nagar, Andheri (W) Mumbai - 400058



**End Semester Examination/Re-Examination MAY/JULY 2025-26**

|     |                                                                                                                                                                                                                            |    |   |   |   |
|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|---|---|---|
| 4b  | Find the mesh currents in the given network.<br>                                                                                         | 10 | 2 | 3 | 4 |
| 5a. | Find the current through 10 ohm resistance in the given network using superposition theorem and verify the same by nodal analysis.<br> | 15 | 1 | 4 | 1 |
| 5b. | Write the mesh equations for the given network.<br>                                                                                    | 5  | 2 | 3 | 4 |



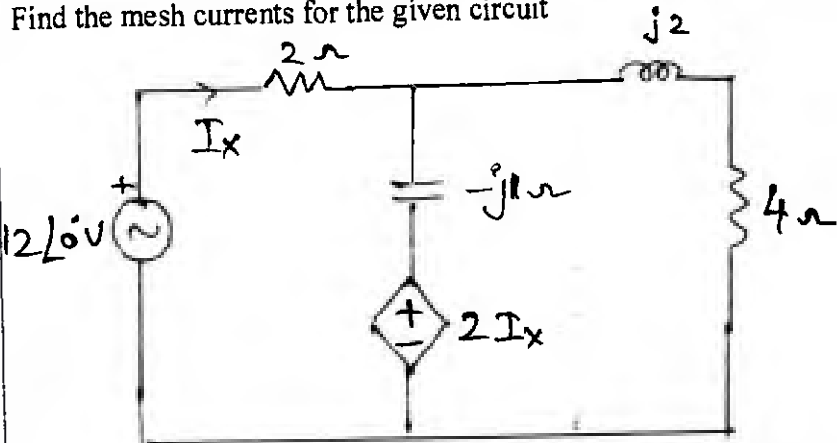
Bharatiya Vidya Bhavan's

# SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)  
Munshi Nagar, Andheri (W) Mumbai - 400058



End Semester Examination/~~Re-Examination~~ MAY/JULY 2025-26

|    |                                                                                                                                                                                                                                                                                                                                                                 |    |   |   |   |
|----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|---|---|---|
| 6a | Two impedances $Z_1=20+j10$ and $Z_2=10-j30$ are connected in parallel and this combination is connected in series with $Z_3=30+jX$ . Find the value of $X$ which will produce resonance.                                                                                                                                                                       | 6  | 1 | 3 | 3 |
| b  | Find the mesh currents for the given circuit<br>                                                                                                                                                                                                                             | 8  | 1 | 3 | 1 |
| c  | Two coils with coefficient of coupling of 0.7, between them are connected in series so as to magnetize in a) same direction, b) opposite direction. The total inductance in the same direction is 1.6H and in the opposite direction is 0.6H. Find the self inductance of the coils.                                                                            | 6  | 2 | 3 | 4 |
| 7a | A three phase, 220V, 50Hz, 11.2KW induction motor has full load efficiency of 88% and draws a line current of 38A. Under full load condition, when connected to a three phase, 220V, 50Hz supply, find the readings, on two wattmeters connected in the circuit to measure the input to the motor. Determine also power factor at which the motor is operating. | 10 | 3 | 3 | 5 |
| 7b | Derive the expressions for resonant frequency, bandwidth, resonance condition for a series RLC circuit. Show the variations of $R, L, C, Z$ and current with respect to frequency and bandwidth.                                                                                                                                                                | 10 | 1 | 2 | 3 |



Bharatiya Vidya Bhavan's



**Sardar Patel College of Engineering**

(A Government Aided Autonomous Institute)

Munshi Nagar, Andheri (West), Mumbai – 400058.

**End Semester Exam**

**May 2026**

**Communication Skills**

18/5/26

Max. Marks: 100

Hours

Class: F.Y. B. Tech (CME)

Tech

Course Code: AE BT 201

Semester: II

Duration: 3

Program: B.

**NOTE:**

- Question number **One** is compulsory.
- Out of remaining **Six** questions attempt any four
- Please write subsections of questions in a sequence
- Draw diagrams and charts wherever necessary

| Sr.No     | Questions                                                                                                                                                                                                                                         | Points | CO | BL |
|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|----|----|
| Q.1.<br>A | Evaluate the effectiveness of formal and informal channels of communication in a business organisation. discuss the advantages, limitations, of Horizontal channel of communication.                                                              | 12     | 02 | 01 |
| Q.1.B     | Short Notes on any ONE<br>a. AIDA principles of sales letter with examples<br>b. Socio-psychological barriers to communication<br>c. Listening Skills – Discus barriers, and types of Listening skills and strategies to improve listening skills | 08     | 02 | 02 |
| Q.2.A     | Explain the basic characteristics of Communication Briefly explain the Johari Window model of effective communication theory Highlight its relevance to modern organisational communication.                                                      | 12     | 03 | 03 |
| Q.2.B     | Explain the principles of business correspondence in detail                                                                                                                                                                                       | 08     | 02 | 01 |
| Q.3.A     | An educational institute, Bright Future Academy, 121 B lane, Samarth Nagar, Bangalore has written to your company enquiring                                                                                                                       | 12     |    |    |

|         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |    |    |    |
|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|----|----|
|         | <p>about ergonomic benches for their classrooms. They are particularly interested in the design features that support student posture and comfort, durability and maintenance requirements, pricing and bulk order discounts, delivery timelines and installation support. As the Sales Manager of Edu Furn Solutions Pvt. Ltd.,</p> <p>Draft a <b>formal reply letter</b> to the enquiry. Your letter should convert the reply into an order. Invent Necessary details. ( Use Semi Block Form)</p>                                                                                                                                                                                                                                              |    |    |    |
| Q.3.B   | <p>"Reading is Learning from an absent teacher". In view of the above explain the importance of reading, the barriers affecting reading skills and elaborate on the Mind mapping and Eye training to improve reading.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 08 |    |    |
| Q.4. A. | <p>You are a first-year student of <i>sardar Patel college of Engineering</i>. As per the requirement of NEP every student has to complete a 15 days internship in their respective field of interest. The First Year Head of Department has asked each branch to draft a formal email to potential companies/ Institutes/ Start-ups. Draft a formal email enquiring about internship opportunities. Please keep the principal in CC.</p>                                                                                                                                                                                                                                                                                                        | 12 |    |    |
| Q.4. B  | <p>Draw the Complete block format mentioning the compulsory and optional parts of the letter.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 08 |    |    |
| Q.5.A   | <p>Describe with quotes the importance of non-verbal communication in business interactions. Explain in detail the aspects of Body language in effective communication.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 12 | 04 | 05 |
| Q.5.B   | <p><b>Case Study</b></p> <p>A German engineering firm is collaborating with an Indian IT company on a smart manufacturing project. During a virtual meeting:</p> <ul style="list-style-type: none"> <li>The German project lead uses highly technical jargon and abbreviations (e.g., "MES," "SCADA," "Kanban loops"), which confuse some Indian team members unfamiliar with these terms.</li> <li>The video call suffers from poor connectivity, causing delays and distorted audio.</li> <li>The German team expects punctuality and strict adherence to agenda, while the Indian team members occasionally join late and prefer a more flexible discussion style.</li> <li>One Indian engineer uses humor and casual phrases like</li> </ul> | 08 | 04 | 05 |

|            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |    |    |    |
|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|----|----|
|            | <p>"chalta hai" (it's okay), which the German team interprets as lack of seriousness.</p> <p>Questions:</p> <ol style="list-style-type: none"> <li>1. Identify the <b>semantic barriers</b> in this case. 01</li> <li>2. Identify the <b>physical barriers</b> in this case. 01</li> <li>3. Identify the <b>cultural barriers</b> in this case. 02</li> <li>4. Explain how these barriers interact to worsen miscommunication. 02</li> <li>5. Suggest strategies to overcome at least two of these barriers. 02</li> </ol>                                                                                                                                                                         |    |    |    |
| Q.6.A      | <p>You are the Purchase Officer at <i>Bright Future Academy</i>. Last month, your institute ordered <b>50 ergonomic benches</b> from <i>Paras solutions Ltd.</i> for classroom use. After delivery, you noticed several issues, few benches have uneven legs, making them unstable. The promised lumbar support feature is missing in many units. Some benches arrived with scratches and chipped edges. The delivery was delayed by two weeks, causing inconvenience during the new semester.</p> <p>Draft a <b>formal complaint letter</b> to the Customer Service Manager of <i>Paras Solutions Pvt Ltd.</i> Asking for fair compensation for the damaged items. (Use Complete Block Form).</p> | 12 | 04 | 01 |
| Q.6.B      | Describe the Importance of Grapevine in an organisation. Explain the advantages and limitations of Grapevine communication.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 08 |    |    |
| Q.7.<br>A  | "Spoken Words wield great Power". In the context of this statement, elucidate the importance of speaking skills and the barriers to speaking. Describe strategies for effective public speaking.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 12 |    |    |
| Q.7.<br>B. | Explain the process of communication and its elements. Why is Communication skills important for engineers.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 08 |    |    |



# SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)  
Munshi Nagar, Andheri (W) Mumbai - 400058



## END SEMESTER EXAMINATION MAY 2026 / ~~RE-EXAM~~ JULY 2026

Program: Civil/Mechanical/Electrical

Duration: 3 hours

Course Code: BS-BTC201/BTM201/BTE201

Maximum Points: 100

Course Name: ICDN

Semester: II

1. Use of non-programmable calculator is allowed
2. All questions are compulsory

| Q.No. | Questions                                                                                                                          | Points | CO | BL    | Modu No. |
|-------|------------------------------------------------------------------------------------------------------------------------------------|--------|----|-------|----------|
| 1a)   | Find length of the loop of the curve $3ay^2 = x(x-a)^2$                                                                            | 06     | 3  | 3,4,5 | 3        |
| 1b)   | Prove that : $\int_0^{\infty} \sqrt{t} e^{-t^2} dt \cdot \int_0^{\infty} \frac{e^{-t^2}}{\sqrt{t}} dt = \frac{\pi}{2\sqrt{2}}$     | 06     | 3  | 2,4,5 | s.s      |
| 1c)   | Evaluate $\iiint \frac{1}{(1+x+y+z)^3} dx dy dz$ over the volume of the tetrahedron $x=0, y=0, z=0, x+y+z=1$                       | 08     | 3  | 3,4,5 | 5        |
| 2a)   | Evaluate $\iint xy dx dy$ over the region bounded by the x-axis, ordinate $x=2a$ and parabola $x^2=4ay$ .                          | 06     | 3  | 2,4,5 | 4        |
| 2b)   | Find the area of the cardioid $r = a(1 + \cos \theta)$                                                                             | 06     | 2  | 3,4,5 | 5        |
| 2c)   | Solve $\left( \frac{\log y - 1}{\sqrt{x^2 + 1}} + x^2 \right) dx + \frac{1}{y} \log(x + \sqrt{x^2 + 1}) dy = 0$ . (given $y > 0$ ) | 08     | 1  | 2,4,5 | 1        |
| 3a)   | Solve $(1 + y^2) dx = (e^{\tan^{-1} y} - x) dy$                                                                                    | 06     | 1  | 2,4,5 | 1        |
| 3b)   | Change to polar coordinates and evaluate $\int_0^1 \int_0^x (x+y) dy dx$ .                                                         | 06     | 2  | 4,5   | 3        |
| 3c)   | solve $(2x+1)^2 \frac{d^2 y}{dx^2} - 2(2x+1) \frac{dy}{dx} - 12y = 6x$                                                             | 08     | 2  | 2,4,5 | 2        |



Bharatiya Vidya Bhavan's  
**SARDAR PATEL COLLEGE OF ENGINEERING**

(Government Aided Autonomous Institute)  
Munshi Nagar, Andheri (W) Mumbai – 400058



**END SEMESTER EXAMINATION MAY 2026 / RE - EXAM JULY 2026**

|     |                                                                                                                                                                                                                         |    |   |       |     |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|---|-------|-----|
| 4a) | Prove that $\int_0^3 \frac{x^{3/2}}{\sqrt{3-x}} dx + \int_0^1 \frac{1}{\sqrt{1-x^{1/4}}} dx = \frac{432\pi}{35}$                                                                                                        | 06 | 3 | 2,4,5 | s.s |
| 4b) | Find the mass of lamina bounded by the curve in $y^2 = ax, x^2 = ay$ where density of the lamina at any point varies as the square of its distance from the origin.                                                     | 06 | 3 | 3,4,5 | 5   |
| 4c) | If $\frac{dy}{dx} = y - x$ and $y(0) = 2$ then using Taylor's series find $y$ at $x = 0.4$ .<br>Compare the result with exact solution.                                                                                 | 08 | 1 | 1,4,5 | 1   |
| 5a) | Change the order of integration<br>$\int_0^4 \left\{ \int_{y/2}^{9-y} \phi(x, y) dx \right\} dy$                                                                                                                        | 06 | 2 | 2,4,5 | 3   |
| 5b) | Using Euler method find $y(0.06)$ given $\frac{dy}{dx} = y + x^2, y(0) = 1$ with $h = 0.02$                                                                                                                             | 06 | 1 | 1,4,5 | 1   |
| 5c) | Solve $(D^2 + 2D + 3)y = x - x^2$                                                                                                                                                                                       | 08 | 1 | 4,5   | 2   |
| 6a) | Change the order of integration and evaluate $\int_0^1 \left\{ \int_x^{2-x} \frac{x}{y} dy \right\} dx$ .                                                                                                               | 06 | 2 | 4,5   | 2   |
| 6b) | Solve $x \sin x \frac{dy}{dx} + y(x \cos x - \sin x) = 2$                                                                                                                                                               | 06 | 1 | 2,4,5 | 1   |
| 6c) | Solve $\frac{dy}{dx} = xy$ with initial conditions $y(1) = 2$ and find $y$ at $x = 1.2, 1.4$ by Runge - Kutta Method of Fourth Order                                                                                    | 08 | 1 | 1,4,5 | 1   |
| 7a) | In a circuit containing inductance $L$ , resistance $R$ and voltage $E$ , the current $i$ is given by<br>$L \frac{di}{dt} + Ri = E$ . Find the current $i$ at time $t$ if at $t = 0, i = 0$ and $L, R, E$ are constants | 06 | 3 | 3,5   | 5   |
| 7b) | Evaluate $\int_0^{\log 2} \int_0^x \int_0^{x+y} e^{x+y+z} dx dy dz$                                                                                                                                                     | 06 | 2 | 4,5   | 4   |



Bharatiya Vidya Bhavan's

# SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)

Munshi Nagar, Andheri (W) Mumbai - 400058



**END SEMESTER EXAMINATION MAY 2026 / ~~RE-EXAM~~ JULY 2026**

|     |                                     |    |   |   |   |
|-----|-------------------------------------|----|---|---|---|
| 7c) | State and prove Duplication formula | 08 | 3 | 1 | 4 |
|-----|-------------------------------------|----|---|---|---|



# Bharatiya Vidya Bhavan's SARDAR PATEL COLLEGE OF ENGINEERING

(Government-Aided Autonomous Institute)  
Munshi Nagar, Andheri (W) Mumbai - 400058



End Sem Exam/Re-Exam - MAY 2026/July 2026 Examinations

Program: Electrical

Course Code: PC-BTE201

Course Name: Electronic circuits

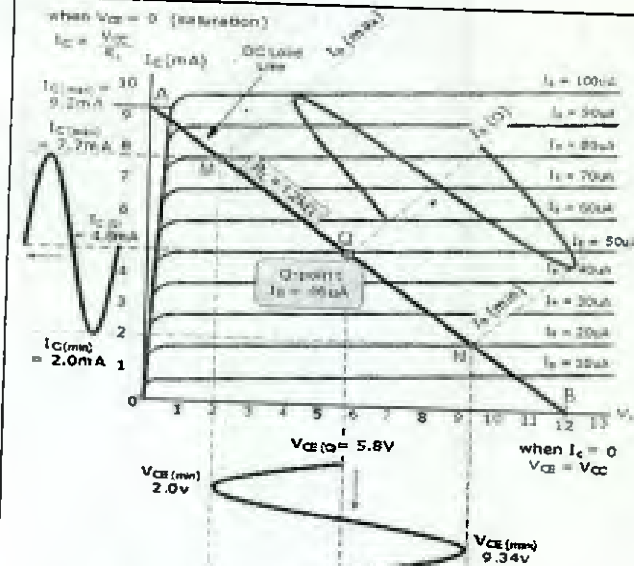
Duration: 3 hours

Maximum Points: 100

Semester: II

- Question 1 is compulsory.
- Attempt any 4 questions from the remaining 6 questions.
- Make suitable assumptions wherever necessary.

25/5/26

| Q.No. | Questions                                                                                                                                                                                                                                                                                    | Points | CO | BL |
|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|----|----|
| 1a.   | Differentiate between BJT and FET                                                                                                                                                                                                                                                            | 05     | 2  | 3  |
| 1b.   | What is critical inductance? Is the value of critical inductance dependent on $R_L$ ? How do we limit the value of this inductance?                                                                                                                                                          | 05     | 1  | 2  |
| 1c.   | Explain the concept of Virtual sort and virtual ground with respect to operational amplifier.                                                                                                                                                                                                | 05     | 3  | 2  |
| 1d.   |  <p>Identify the above graph. Determine the Q point from the figure. Also determine the value of <math>V_{CC}</math> and <math>R_L</math>. Determine <math>\beta</math>, <math>I_{C(P)}</math> value.</p> | 05     | 2  | 3  |
| 2a.   | Explain the OPAMP as a Schmitt Trigger. Draw corresponding waveforms. What are UTP and LTP?                                                                                                                                                                                                  | 10     | 3  | 2  |



Bharatiya Vidya Bhavan's

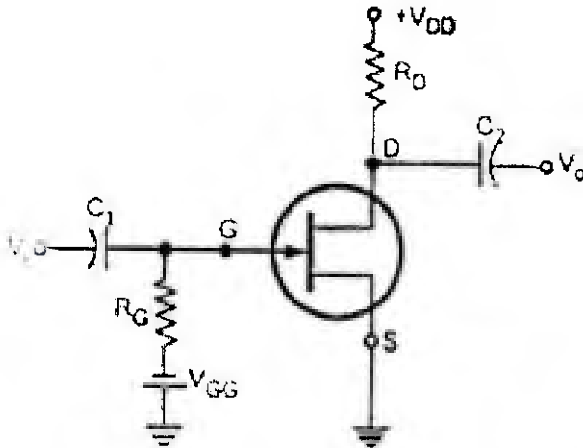
# SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)

Munshi Nagar, Andheri (W) Mumbai - 400058



End Sem Exam/Re-Exam - MAY 2026/July 2026 Examinations

| 2b.   | <p>Explain the concept of thermal Runaway. Calculate the stability factor <math>S(I_{CO})</math> and the change in <math>I_C</math> from <math>25^\circ\text{C}</math> to <math>100^\circ\text{C}</math> for the transistor defined by Table 4.1 for the following emitter-bias arrangements.</p> <p>(a) <math>R_B/R_E = 250</math> (<math>R_B = 250R_E</math>)<br/>           (b) <math>R_B/R_E = 10</math> (<math>R_B = 10R_E</math>).<br/>           (c) <math>R_B/R_E = 0.01</math> (<math>R_E = 100R_B</math>).<br/>           Comment on the results obtained.</p>                                                                | 10      | 2             | 3       |              |      |                      |    |      |      |     |    |      |      |    |    |      |       |                   |     |     |  |  |  |
|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|---------------|---------|--------------|------|----------------------|----|------|------|-----|----|------|------|----|----|------|-------|-------------------|-----|-----|--|--|--|
|       | <p>4.1 Variation of Silicon Transistor Parameters with Temperature</p> <table border="1"> <thead> <tr> <th><math>T</math></th> <th><math>I_{C1}</math> (mA)</th> <th><math>\beta</math></th> <th><math>V_{BE}</math> (V)</th> </tr> </thead> <tbody> <tr> <td><math>25</math></td> <td><math>0.2 \times 10^{-3}</math></td> <td>70</td> <td>0.85</td> </tr> <tr> <td><math>50</math></td> <td>0.1</td> <td>50</td> <td>0.65</td> </tr> <tr> <td><math>75</math></td> <td>20</td> <td>80</td> <td>0.48</td> </tr> <tr> <td><math>100</math></td> <td><math>3.3 \times 10^3</math></td> <td>120</td> <td>0.3</td> </tr> </tbody> </table> | $T$     | $I_{C1}$ (mA) | $\beta$ | $V_{BE}$ (V) | $25$ | $0.2 \times 10^{-3}$ | 70 | 0.85 | $50$ | 0.1 | 50 | 0.65 | $75$ | 20 | 80 | 0.48 | $100$ | $3.3 \times 10^3$ | 120 | 0.3 |  |  |  |
| $T$   | $I_{C1}$ (mA)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | $\beta$ | $V_{BE}$ (V)  |         |              |      |                      |    |      |      |     |    |      |      |    |    |      |       |                   |     |     |  |  |  |
| $25$  | $0.2 \times 10^{-3}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 70      | 0.85          |         |              |      |                      |    |      |      |     |    |      |      |    |    |      |       |                   |     |     |  |  |  |
| $50$  | 0.1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 50      | 0.65          |         |              |      |                      |    |      |      |     |    |      |      |    |    |      |       |                   |     |     |  |  |  |
| $75$  | 20                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 80      | 0.48          |         |              |      |                      |    |      |      |     |    |      |      |    |    |      |       |                   |     |     |  |  |  |
| $100$ | $3.3 \times 10^3$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 120     | 0.3           |         |              |      |                      |    |      |      |     |    |      |      |    |    |      |       |                   |     |     |  |  |  |
| 3a.   | <p>Draw the circuit of fixed bias BJT amplifier with <math>V_{CC} = 9\text{V}</math>, <math>R_C = 0.5\text{K}</math>, <math>R_B = 60\text{K}</math>. Draw dc equivalent circuit. Hence determine <math>I_{BQ}</math>, <math>I_{CQ}</math>, <math>V_{CEQ}</math> and stability factor. Draw ac equivalent circuit. Hence determine input impedance, output impedance for the above circuit. Given <math>h_{ie} = 1.2\text{K}\Omega</math>, <math>h_{fe} = 80</math></p>                                                                                                                                                                  | 10      | 2             | 3       |              |      |                      |    |      |      |     |    |      |      |    |    |      |       |                   |     |     |  |  |  |
| 3b.   | <p>For the circuit shown below, determine <math>V_{GSQ}</math>, <math>I_{DQ}</math>, <math>V_{DSQ}</math>, <math>V_D</math>, <math>V_G</math>, <math>V_S</math>. Given <math>R_G = 1\text{M}\Omega</math>, <math>R_D = 2\text{k}\Omega</math>, <math>I_{DSS} = 10\text{mA}</math>, <math>V_P = -8\text{V}</math>, <math>y_{os} = 40\mu\text{S}</math>, <math>V_{DD} = 16\text{V}</math></p>                                                                                                                                                          | 10      | 2             | 3       |              |      |                      |    |      |      |     |    |      |      |    |    |      |       |                   |     |     |  |  |  |
| 4a.   | <p>Explain basic differentiator using op-amp. What are the problems involved? How are they overcome?</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 10      | 3             | 2       |              |      |                      |    |      |      |     |    |      |      |    |    |      |       |                   |     |     |  |  |  |



Bharatiya Vidya Bhavan's

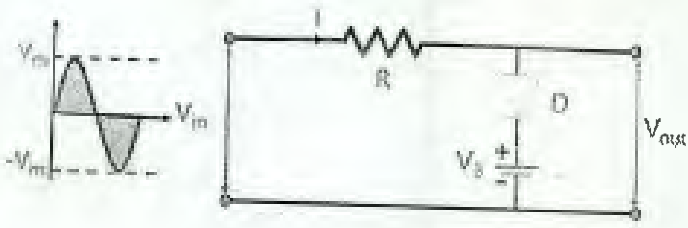
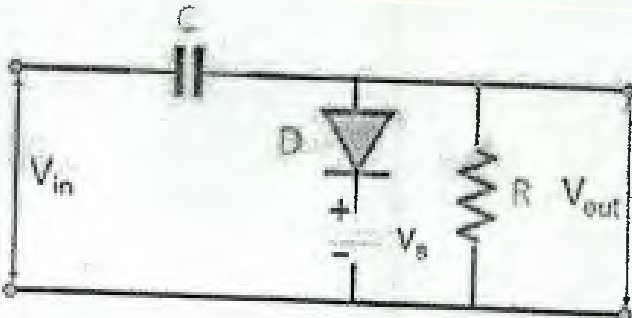
# SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)

Munshi Nagar, Andheri (W) Mumbai - 400058



End Sem Exam/ Re Exam - MAY 2026/July 2026 Examinations

|     |                                                                                                                                                                                                                                                                                    |    |   |   |
|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|---|---|
| 4b. |  <p>Draw the output voltage waveform for the circuit shown below with <math>V_m = 10V</math>, <math>V_B = 6V</math>, <math>R = 1K\Omega</math>. Assume ideal diode.</p>                           |    | 1 | 3 |
| 4c. |  <p>Draw input output waveforms.<br/>Given <math>V_{in} = 15\sin(\omega t)</math>, <math>C = 10\mu F</math>, <math>R = 1M\Omega</math>, <math>V_B = 6.5V</math></p>                              | 05 | 1 | 3 |
| 5a. | Explain the following w.r.t. ideal op-amp<br><ol style="list-style-type: none"><li>1. Slew Rate</li><li>2. Input Offset voltage</li><li>3. Input offset and bias currents</li><li>4. SVRR</li><li>5. Bandwidth</li></ol>                                                           | 10 | 3 | 2 |
| 5b. | State whether the following statements are true/false. Justify the same with proper diagrams.<br><ol style="list-style-type: none"><li>i. MOSFET has higher input resistance.</li><li>ii. Transconductance <math>g_m</math> can be calculated from JFET characteristics.</li></ol> | 10 | 2 | 3 |
| 6a. | Draw the circuit diagram of a BJT-based Dual Input Balanced Output differential amplifier. Perform the AC analysis using hybrid model to derive the expression for differential voltage gain ( $A_d$ ) and common mode gain ( $A_c$ ). Hence derive CMRR expression.               | 10 | 2 | 2 |



Bharatiya Vidya Bhavan's

# SAKAR PATEL COLLEGE OF ENGINEERING

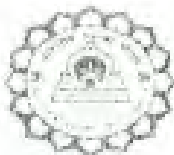
(Government Aided Autonomous Institute)

Munshi Nagar, Andheri (W) Mumbai - 400058



**End Sem Exam/Re-Exam - MAY 2026/July 2026 Examinations**

|     |                                                                                                                                                                                                                                                                                           |    |   |   |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|---|---|
| 6b. | With the help of neat circuit diagrams explain the terms DIBO, DISO, SISO, SBO with respect to differential amplifier.                                                                                                                                                                    | 10 | 2 | 2 |
| 7a. | A full wave rectifier has a diode with forward resistance $50\Omega$ . It supplies power to a load resistance $1200\Omega$ from a $20\text{ V(rms)}$ source. Calculate:<br>i. DC load current<br>ii. AC load current<br>iii. DC voltage<br>iv. DC output power<br>v. Rectifier efficiency | 10 | 1 | 3 |
| 7b. | Differentiate between active and passive clippers with respect to circuit diagram and its working.                                                                                                                                                                                        | 05 | 3 | 3 |
| 7c. | Define ripple factor and efficiency of a rectifier. Derive then expressions for a half-wave rectifier.                                                                                                                                                                                    | 05 | 1 | 2 |



Bharatiya Vidya Bhavan's

# Sardar Patel College of Engineering

(A Government Aided Autonomous Institute)

Munshi Nagar, Andheri (West), Mumbai - 400058.

End Semester Examination/ ~~Re-Examination~~, May /June 2026



116126

Max. Marks: 50 marks

Class: (C/M/E)

Semester: II

Duration: 120Min

Program: F.Y.B. Tech (C/M/E)

Name of the Course: Indian traditional Knowledge

Course Code : IK-BTM201

**Instructions:**

- 1 Read all instructions carefully before attempting the questions
- 2 Justify your answers with examples where applicable
- 3 Prioritize questions that carry higher marks or require more detailed responses.
- 4 Avoid writing excessive content. Stick to the points and explanations relevant to the question
- 5 Attempt any four questions from Q1 to Q5, and any one question from Q6 or Q7.

| Question No |                                                                                                                                                                 | Max. Marks | Course Outcome Number | Module No. |
|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|-----------------------|------------|
| Q1          |                                                                                                                                                                 |            |                       |            |
| a           | Explain how geography, pilgrimage, and shared religious practices helped in maintaining Indian unity.                                                           | 5          | 1,2                   | 1          |
| b           | Write a short note on Mukarji's idea of Indian unity.                                                                                                           | 5          | 1                     | 1          |
| Q2          |                                                                                                                                                                 |            |                       |            |
| a           | Explain the challenges to unity in diversity in modern India.                                                                                                   | 5          | 2                     | 1          |
| b           | Discuss the need for human values in science and technology, with suitable examples.                                                                            | 5          | 2                     | 2          |
| Q3          |                                                                                                                                                                 | 5          |                       | 1          |
| a           | Explain the contribution of Nagarjuna in the field of ancient Indian chemistry and metallurgy                                                                   | 5          | 2                     | 3          |
| b           | Write a short note on the contribution of ancient Indian chemistry in metallurgy, perfumes, pigments, and medicine.                                             | 5          | 1,4                   | 3          |
| Q4          |                                                                                                                                                                 |            |                       |            |
| a           | Discuss how ancient Indian innovations in engineering, such as water management systems and architectural marvels, have influenced modern engineering practices | 5          | 1,4                   | 3          |

— 1 —

|    |   |                                                                                                                                                                                                          |    |     |   |
|----|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|-----|---|
|    | b | Explain how modern lifestyle changes such as sedentary work, stress, unhealthy eating habits, and lack of rest affect physical and mental health.                                                        | 5  | 1,4 | 4 |
| Q5 |   |                                                                                                                                                                                                          |    |     |   |
|    | a | Describe the main features of Ajanta Cave paintings.                                                                                                                                                     | 5  | 3   | 5 |
|    | b | Write a short note on ancient Indian architecture with examples such as Sanchi Stupa, Ajanta Caves, Ellora Caves, Khajuraho Temples, and Brihadeeswara Temple.                                           | 5  | 3   | 5 |
| Q6 |   |                                                                                                                                                                                                          |    |     |   |
|    | a | Compare the dance forms and music traditions of any two assigned states. Explain how these art forms reflect their cultural identity, folk traditions, and social life.                                  | 10 | 1,3 | 5 |
| Q7 |   |                                                                                                                                                                                                          |    |     |   |
|    | a | Prepare a detailed comparative study of two states from different regions of India based on language, food, dress, festivals, art forms, and architecture. Add suitable examples to support your answer. | 10 | 3,4 | 6 |



Bharatiya Vidya Bhavan's

# SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)

Munshi Nagar, Andheri (W) Mumbai - 400058



~~End-Sem Exam/Re Exam~~ - MAY 2026/July 2026 Examinations

Program: Electrical *PC, B. Tech (E) Unit*

Course Code: PC-BTE201

Course Name: Electronic circuits

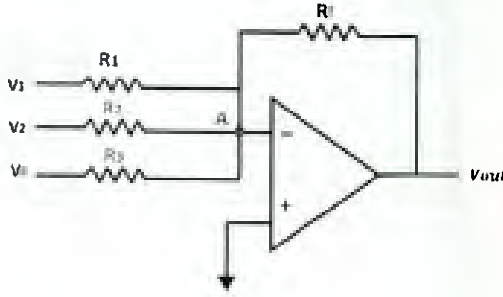
Duration: 3 hours

Maximum Points: 100

Semester: II

- Question 1 is compulsory.
- Attempt **any 4** questions from the remaining 6 questions.
- Make suitable assumptions wherever necessary.

*17/7/26*

| Q.No. | Questions                                                                                                                                                                                                                                                                                                                                                                                       | Points | CO | BL |
|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|----|----|
| 1a.   | Draw the output waveform of a Half Wave Rectifier and hence derive the equation for $I_{DC}$ .                                                                                                                                                                                                                                                                                                  | 05     | 1  | 2  |
| 1b.   | Explain the significance of replacing the resistor $R_E$ with a constant current source in a differential amplifier. How does this modification affect the Common Mode Rejection Ratio (CMRR)?                                                                                                                                                                                                  | 05     | 2  | 2  |
| 1c.   |  <p>For the above circuit find the equation of <math>V_{out}</math>.</p>                                                                                                                                                                                                                                     | 05     | 3  | 3  |
| 1d.   | Explain the importance of time constant (RC) in the working of a clamper circuit.                                                                                                                                                                                                                                                                                                               | 05     | 1  | 2  |
| 2a.   | With the help of neat circuit diagrams explain the terms DIBO, DISO, SISO, SIBO with respect to differential amplifier.                                                                                                                                                                                                                                                                         | 10     | 2  | 2  |
| 2b.   | Define CMRR. The following specifications are given for the dual input, balanced-output differential amplifier: $R_C = 5\text{ k}\Omega$ , $R_S = 100\Omega$ , $R_E = 50\text{ K}\Omega$ , $+V_{CC} = 10\text{V}$ , $-V_{EE} = -10\text{V}$ , $h_{ie} = 2\text{ k}\Omega$ , $h_{fe} = 50$ . Draw the circuit diagram showing components values. Determine $A_d$ , $A_c$ . Determine CMRR in dB. | 10     | 2  | 3  |



Bharatiya Vidya Bhavan's

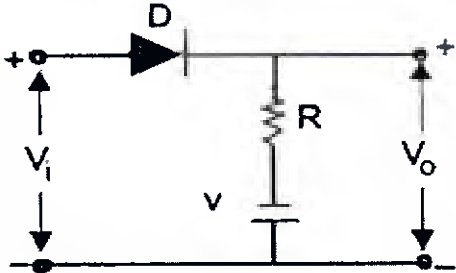
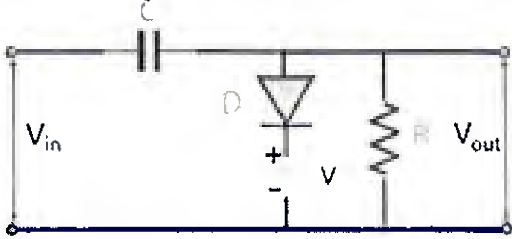
# SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)

Munshi Nagar, Andheri (W) Mumbai - 400058



**End Sem Exam/Re Exam - MAY 2026/July 2026 Examinations**

|     |                                                                                                                                                                                                                                                                                                                                                                  |    |   |   |
|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|---|---|
| 3a. | Draw input output waveforms.<br>Given $V_i = 12\sin(\omega t)$ , $R = 1M\Omega$ , $V = -4V$<br>                                                                                                                                                                                 | 05 | 1 | 3 |
| 3b. | Draw input output waveforms.<br>Given $V_i = 15\sin(\omega t)$ , $C = 10\mu F$ , $R = 1M\Omega$ , $V = 6.5V$<br>                                                                                                                                                               | 05 | 1 | 3 |
| 3c. | What is Instrumentation amplifier? How is it different than normal subtractor. What is the need for buffers in it?<br>Design Instrumentation amplifier with gain 12.                                                                                                                                                                                             | 10 | 3 | 3 |
| 4a. | Draw the circuit of fixed bias BJT amplifier with $V_{cc} = 12V$ , $R_c = 3K\Omega$ , $R_B = 240K\Omega$ . Draw dc equivalent circuit. Hence determine $I_{BQ}$ , $I_{CQ}$ , $V_{CEQ}$ and stability factor S. Draw ac equivalent circuit. Hence determine input impedance, output impedance for the above circuit. Given $h_{ie} = 1.5K\Omega$ , $h_{fe} = 100$ | 10 | 2 | 3 |
| 4b. | Explain the following w.r.t. ideal op-amp<br><ol style="list-style-type: none"><li>1. Transfer Characteristics</li><li>2. Equivalent circuit of Op-amp</li><li>3. Gain with and without feedback</li></ol>                                                                                                                                                       | 10 | 3 | 2 |
| 5a. | Draw circuit diagram of full wave rectifier with C filter. Draw input and output waveforms. Explain the working of the circuit. Calculate the ripple factor of a C filter which has capacitor of $16\mu F$ and is fed from full wave rectifier and 50Hz mains. The load resistance is $4k\Omega$ .                                                               | 10 | 1 | 3 |



Bharatiya Vidya Bhavan's

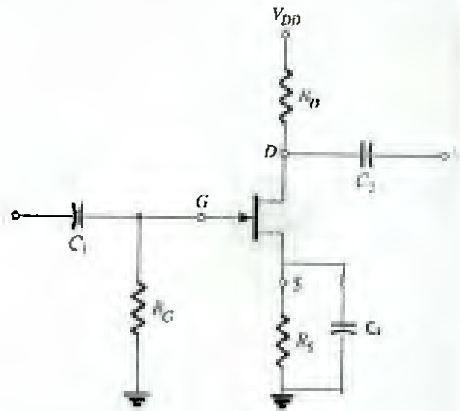
# SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)

Munshi Nagar, Andheri (W) Mumbai - 400058



**End Sem Exam/Re Exam - MAY 2026/July 2026 Examinations**

| 5b.              | Explain basic integrator using op-amp. What are the problems involved? How are they overcome?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 10               | 3             | 2       |              |     |                      |    |      |    |     |    |      |     |    |    |      |     |                   |     |     |    |   |   |
|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|---------------|---------|--------------|-----|----------------------|----|------|----|-----|----|------|-----|----|----|------|-----|-------------------|-----|-----|----|---|---|
| 6a.              | <p>Draw DC and AC equivalent circuit of the following circuit. Determine <math>V_{GSQ}</math>, <math>I_{DQ}</math>, <math>V_{DSQ}</math>. Determine <math>A_v</math>, <math>Z_i</math>, <math>Z_o</math>. Given: <math>R_G = 1M\Omega</math>, <math>R_D = 3.3k\Omega</math>, <math>R_S = 1k\Omega</math>, <math>I_{DSS} = 8mA</math>, <math>V_P = -6V</math>, <math>y_{os} = 40\mu S</math>, <math>V_{DD} = 20V</math></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 10               | 2             | 3       |              |     |                      |    |      |    |     |    |      |     |    |    |      |     |                   |     |     |    |   |   |
| 6b.              | Explain the construction and working of n-channel JFET. Justify the statement JFET is a voltage-controlled device.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 10               | 2             | 2       |              |     |                      |    |      |    |     |    |      |     |    |    |      |     |                   |     |     |    |   |   |
| 7a.              | <p>Explain the concept of thermal Runaway. Calculate the stability factor <math>S(I_{CO})</math> and the change in <math>I_C</math> from <math>25^\circ C</math> to <math>100^\circ C</math> for the transistor defined by Table 4.1 for the following emitter-bias arrangements.</p> <p>(a) <math>R_B/R_E = 250</math> (<math>R_B = 250R_E</math>)<br/>           (b) <math>R_B/R_E = 10</math> (<math>R_B = 10R_E</math>).<br/>           (c) <math>R_B/R_E = 0.01</math> (<math>R_E = 100R_B</math>).<br/>           Comment on the results obtained.</p> <table border="1"> <caption>TABLE 4.1 Variation of Silicon Transistor Parameters with Temperature</caption> <thead> <tr> <th>T (<math>^\circ C</math>)</th> <th><math>I_{CQ}</math> (mA)</th> <th><math>\beta</math></th> <th><math>V_{BE}</math> (V)</th> </tr> </thead> <tbody> <tr> <td>-65</td> <td><math>0.2 \times 10^{-3}</math></td> <td>20</td> <td>0.85</td> </tr> <tr> <td>25</td> <td>0.1</td> <td>30</td> <td>0.65</td> </tr> <tr> <td>100</td> <td>20</td> <td>80</td> <td>0.48</td> </tr> <tr> <td>175</td> <td><math>3.3 \times 10^3</math></td> <td>120</td> <td>0.3</td> </tr> </tbody> </table> | T ( $^\circ C$ ) | $I_{CQ}$ (mA) | $\beta$ | $V_{BE}$ (V) | -65 | $0.2 \times 10^{-3}$ | 20 | 0.85 | 25 | 0.1 | 30 | 0.65 | 100 | 20 | 80 | 0.48 | 175 | $3.3 \times 10^3$ | 120 | 0.3 | 10 | 2 | 3 |
| T ( $^\circ C$ ) | $I_{CQ}$ (mA)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | $\beta$          | $V_{BE}$ (V)  |         |              |     |                      |    |      |    |     |    |      |     |    |    |      |     |                   |     |     |    |   |   |
| -65              | $0.2 \times 10^{-3}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 20               | 0.85          |         |              |     |                      |    |      |    |     |    |      |     |    |    |      |     |                   |     |     |    |   |   |
| 25               | 0.1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 30               | 0.65          |         |              |     |                      |    |      |    |     |    |      |     |    |    |      |     |                   |     |     |    |   |   |
| 100              | 20                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 80               | 0.48          |         |              |     |                      |    |      |    |     |    |      |     |    |    |      |     |                   |     |     |    |   |   |
| 175              | $3.3 \times 10^3$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 120              | 0.3           |         |              |     |                      |    |      |    |     |    |      |     |    |    |      |     |                   |     |     |    |   |   |
| 7b.              | Differentiate between active and passive clippers with respect to circuit diagram and its working.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 05               | 3             | 2       |              |     |                      |    |      |    |     |    |      |     |    |    |      |     |                   |     |     |    |   |   |
| 7c.              | Define ripple factor and efficiency of a rectifier. Derive expressions for a half-wave rectifier.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 05               | 1             | 2       |              |     |                      |    |      |    |     |    |      |     |    |    |      |     |                   |     |     |    |   |   |



Bharatiya Vidya Bhavan's  
**SARDAR PATEL COLLEGE OF ENGINEERING**

(Government Aided Autonomous Institute)  
Munshi Nagar, Andheri (W) Mumbai – 400058



**End Semester Examination/Re- Examination MAY/JULY 2025-26**

Program: FY-Electrical *sun 15*

Duration: 3 hours

Course Code: ES-BTE201

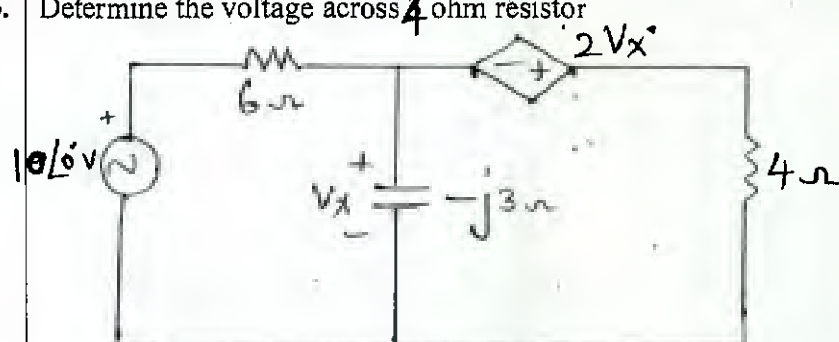
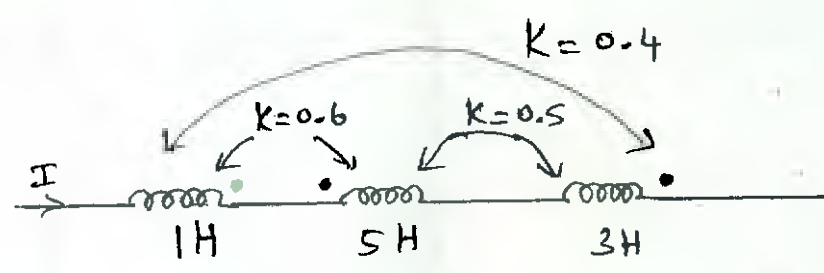
Maximum Points: 100

Course Name: Basic electrical Engineering II

Semester: II

Notes: Answer any 5 questions.

*16/7/26*

| Q.n<br>o. | Questions                                                                                                                                                                                                          | marks | C<br>O | B<br>L | mo<br>du<br>le |
|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|--------|--------|----------------|
| 1a.       | Obtain the value of R,L,C in a series RLC circuit that resonates at 1.5kHz and consumes 50W from a 50V ac source operating at resonant frequency. Bandwidth is 0.75Hz.                                             | 5     | 2      | 3      | 3              |
| 1b.       | Determine the voltage across <i>4</i> ohm resistor<br>                                                                           | 5     | 1      | 3      | 1              |
| 1c.       | For the given coupled circuit find the equivalent inductance.<br>                                                              | 5     | 2      | 3      | 4              |
| 1d.       | Estimate the power factor in each of the following cases of two wattmeter method of power measurement, i) Wattmeter readings are equal ii) Wattmeter readings are equal and opposite iii) One wattmeter reads zero | 5     | 3      | 1      | 5              |

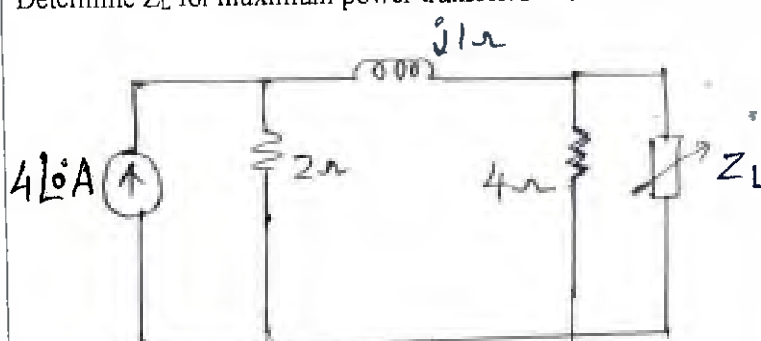
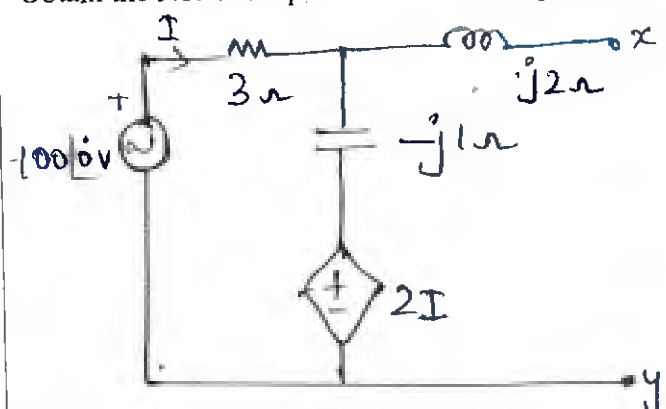


Bharatiya Vidya Bhavan's  
**SARDAR PATEL COLLEGE OF ENGINEERING**

(Government Aided Autonomous Institute)  
Munshi Nagar, Andheri (W) Mumbai - 400058



**End Semester Examination/Re- Examination MAY/JULY 2025-26**

|     |                                                                                                                                                                                                                                                                                                                                                  |    |   |   |   |
|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|---|---|---|
| 2a. | How can power factor be determined in a three phase, 3 wire balanced delta connected load with lagging power factor. Explain with neat circuit and phasor diagrams.                                                                                                                                                                              | 10 | 3 | 3 | 5 |
| 2b. | Two balanced three phase loads are connected in parallel to a 415V, 3 phase, 50Hz ac supply. The loads are: Load A: draws 10A at 0.8 lag pf, star connected<br>Load B: $R=6\Omega$ $C=198$ microfarads per phase delta connected.<br>Estimate i), reactive power and active power in each case and<br>ii) power factor of load B and its nature. | 10 | 3 | 3 | 5 |
| 3a. | Determine $Z_L$ for maximum power transfer. Calculate the maximum power drawn.<br>                                                                                                                                                                             | 10 | 1 | 3 | 2 |
| 3b. | Derive the relation between line current and phase current, line voltage and phase voltage in a Star connected three phase system with neat circuit and phasor diagrams.                                                                                                                                                                         | 10 | 3 | 2 | 5 |
| 4a  | Obtain the Nortons equivalent circuit for given network.<br>                                                                                                                                                                                                  | 10 | 1 | 3 | 2 |

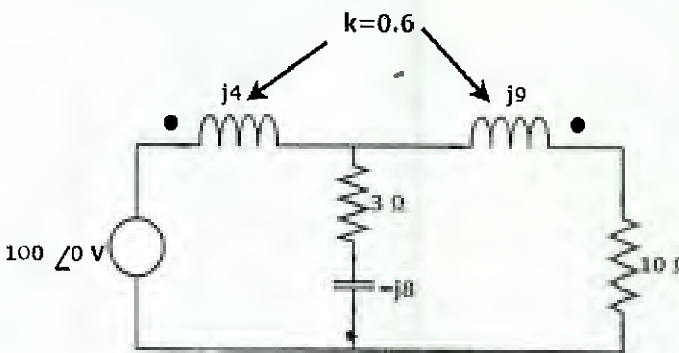
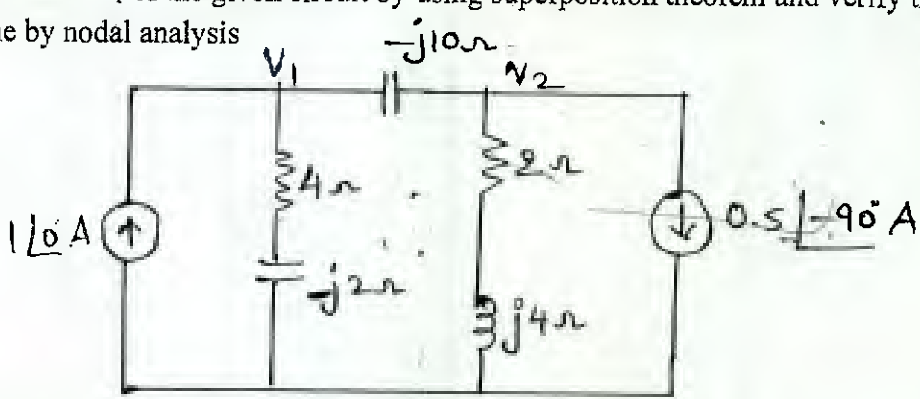
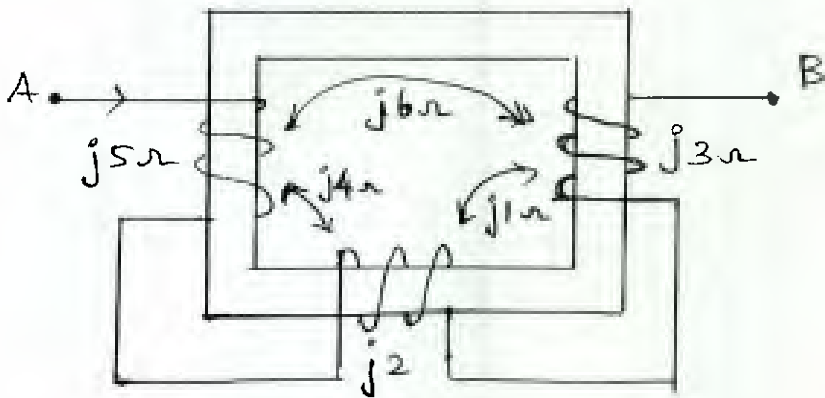


Bharatiya Vidya Bhavan's  
**SARDAR PATEL COLLEGE OF ENGINEERING**

(Government Aided Autonomous Institute)  
Munshi Nagar, Andheri (W) Mumbai - 400058



**End Semester Examination/Re- Examination MAY/JULY 2025-26**

|     |                                                                                                                                                                                                  |    |   |   |   |
|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|---|---|---|
| 4b  | Calculate the mesh currents for the given circuit.<br>                                                          | 10 | 2 | 3 | 4 |
| 5a. | Determine $V_1$ of the given circuit by using superposition theorem and verify the same by nodal analysis<br> | 15 | 1 | 4 | 1 |
| 5b. | Obtain the dotted equivalent for the given circuit and equivalent inductive reactance.<br>                   | 5  | 2 | 3 | 4 |

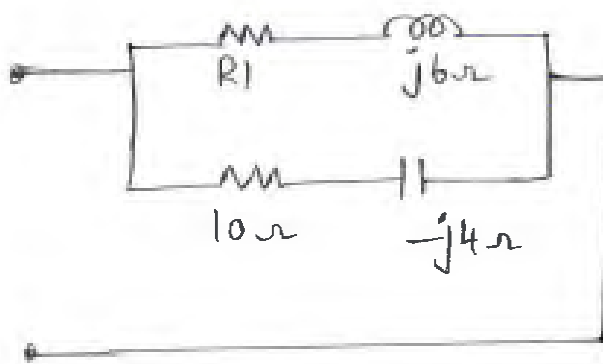
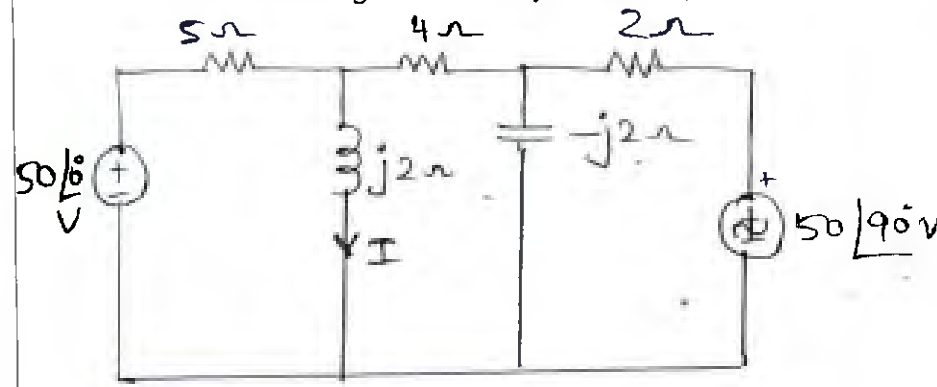


Bharatiya Vidya Bhavan's  
**SARDAR PATEL COLLEGE OF ENGINEERING**

(Government Aided Autonomous Institute)  
Munshi Nagar, Andheri (W) Mumbai – 400058



**End Semester Examination/Re- Examination MAY/JULY 2025-26**

|    |                                                                                                                                                                                                                                                              |    |   |   |   |
|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|---|---|---|
| 6a | Find the value of $R_1$ such that the given circuit is resonant<br>                                                                                                         | 6  | 1 | 3 | 3 |
| b  | Find the current $I$ for the given circuit by nodal analysis.<br>                                                                                                         | 8  | 1 | 3 | 1 |
| c  | The combined inductances of two coils connected in series are 0.5H or 0.1H depending on the relative directions of currents in the two coils. If one of the coils has a self inductance of 0.3H, find the mutual inductance and coefficient of coupling      | 6  | 2 | 3 | 4 |
| 7a | Three resistances each having a value of $40\Omega$ are connected in i) star and ii) delta across 400V, 3 phase supply. Calculate the power taken from the supply. If one of the three resistances gets open circuited find the power consumed in each case. | 10 | 3 | 3 | 5 |
| 7b | Derive the expressions for resonant frequency, bandwidth, resonance condition for a series RLC circuit. Show the variations of $R, L, C, Z$ and current with respect to frequency and bandwidth.                                                             | 10 | 1 | 2 | 3 |



Bharatiya Vidya Bhavan's  
Sardar Patel College of Engineering  
(A Government Aided Autonomous Institute)  
Munshi Nagar, Andheri (West), Mumbai – 400058.



**END SEM/RE-EXAM EXAMINATION MAY/JUNE 2025-26**

Total Marks: 100

CLASS/SEM : F.Y.B.Tech Electrical Sem.-II

COURSE CODE: BSBTE202

Duration: 3 Hrs

COURSE NAME : ENGINEERING PHYSICS

15/7/26

- Answer any FIVE questions out of SEVEN.
- Answers to all sub questions should be grouped together!
- Diagrams have to be drawn wherever necessary. Assume suitable data (if necessary) and state your assumptions clearly.
- Marks for each question are indicated against it. Figures to the right indicate Module no (MN), Course Outcome (CO) and Bloom's Taxonomy Level (BL) respectively.
- Marks will be given on the basis of what will be written in the paper irrespective of your intentions!

Good luck!

| Q1. | (20 mark) (4 mark each)                                                                                                                                                                                                                                                                                                                                                                                      | MN/<br>CO | BL |
|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|----|
| a.  | Prove using Heisenberg's uncertainty principle that a particle in a box of infinite height cannot have Zero energy!                                                                                                                                                                                                                                                                                          | 1         | 3  |
| b.  | In a region of space, a particle with mass $m$ and with zero energy has a time-independent wave function $\psi(x) = Axe^{-x^{2/L^2}}$ . Determine the potential energy of the particle.                                                                                                                                                                                                                      | 2         | 3  |
| c.  | Find the field outside a uniformly charged sphere of radius $R$ and total charge $q$ .                                                                                                                                                                                                                                                                                                                       | 3         | 3  |
| d.  | In an oscillator, the value of inductance and capacitance is $5\text{mH}$ and $9\text{pF}$ . Given density of rod $= 2.5\text{ gm/cc}$ , $Y=8 \times 10^{10}\text{ N/m}^2$ , find length of the rod and frequency.                                                                                                                                                                                           | 4         | 3  |
| e.  | If the pulse width of a Nd:YAG laser is $25\text{ms}$ and average output power per pulse is $0.8\text{W}$ , how many photons does each pulse contain?                                                                                                                                                                                                                                                        | 5         | 3  |
| Q2. | (20 mark) (4 mark each)                                                                                                                                                                                                                                                                                                                                                                                      |           |    |
| a.  | A bullet of mass $0.03\text{ kg}$ is moving with a velocity of $500\text{ m/s}$ . The speed is measured up to an accuracy of $0.02\%$ . Calculate the uncertainty in it's position. Also comment on the result.                                                                                                                                                                                              | 1         | 3  |
| b.  | What is the $\Delta E$ between the $n=2$ and $n=3$ states for an $F_2$ molecule trapped within a one-dimension well of length $3.0\text{ cm}$ ? At what value of $n$ does the energy of the molecule reach $\frac{1}{4}k_B T$ at $450\text{ K}$ , and what is the separation between this energy level and the one immediately above it? Given: mass of $F_2$ molecule is $3.16 \times 10^{-26}\text{ kg}$ . | 2         | 3  |
| c.  | Find gradient of magnitude of the position vector $\vec{r}$ .                                                                                                                                                                                                                                                                                                                                                | 3         | 3  |
| d.  | An ultrasonic beam of $1\text{cm}$ sent by a ship, returns from the sea bed after $2\text{s}$ . The velocity of ultrasonic waves in sea water is $1510\text{ m/s}$ and $0^\circ\text{C}$ . Salinity of sea water is $2\text{gm/lit}$ at $T=30^\circ\text{C}$ . Calculate the depth of the sea and frequency at $30^\circ\text{C}$ .                                                                          | 4         | 3  |
| e.  | Calculate the angular spread of Nd:YAG laser beam due to diffraction, if the beam emerges through a $3\text{mm}$ diameter mirror. If this laser has an output power of $2.3\text{mW}$ , how many photons are emitted each second by this laser when operating?                                                                                                                                               | 5         | 3  |

|     |                                                                                                                                                                                                                                                                                                                                   |   |     |
|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|-----|
| Q3. | (20 mark)                                                                                                                                                                                                                                                                                                                         |   |     |
| a.  | (8 mark) An electron and a 250 gm ball are traveling at 200 m/s measured to an accuracy of 0.065%. Calculate the (a) uncertainty in position of each of the bodies, (b) de-Broglie wavelengths and (c) Uncertainty in the energies. Compare the values and comment.                                                               | 1 | 3   |
| b.  | (6 mark) Velocity of ultrasonic waves in mild steel is $5.9 \times 10^3$ m/s. The velocity of ultrasonic waves in brass calibrated for mild steel measured by an ultrasonic gauge meter is $4.8 \times 10^3$ m/s. If the thickness of the brass plate measured by gauge meter is 12.8cm, calculate its real thickness.            | 4 | 3,4 |
| c.  | (6 mark) Explain working of a threelevel pumping scheme.                                                                                                                                                                                                                                                                          | 5 | 3   |
| Q4. | (20 mark)                                                                                                                                                                                                                                                                                                                         |   |     |
| a.  | (8 mark) Describe the formation of X-rays using a Coolidge tube.                                                                                                                                                                                                                                                                  | 1 | 2   |
| b.  | (6 mark) Evaluate the electric field at a distance z above the centre of a straight line carrying uniform line charge density $\lambda$ .                                                                                                                                                                                         | 3 | 4   |
| c.  | (6 mark) Explain working of a piezoelectric oscillator using a neat and labeled diagram.                                                                                                                                                                                                                                          | 4 | 2   |
| Q5. | (20 mark)                                                                                                                                                                                                                                                                                                                         |   |     |
| a.  | (8 mark) State the value of energy and wavefunction of a particle confined in a one dimensional box of length L, and plot the wavefunctions and probabilities. Evaluate the ground state energy (in eV) of a proton confined to a one-dimensional box the size of the uranium nucleus that has a radius of approximately 15.0 fm. | 2 | 1,2 |
| b.  | (6 mark) Explain working of an optical resonator using a four level pumping scheme.                                                                                                                                                                                                                                               | 5 | 4   |
| c.  | (6 mark) State and explain Heisenberg's Uncertainty Principle using the concept of wavegroup.                                                                                                                                                                                                                                     | 1 | 1,2 |
| Q6. | (20 mark)                                                                                                                                                                                                                                                                                                                         |   |     |
| a.  | (8 mark) State Maxwell's equations in vacuum and hence derive electric wave equations.                                                                                                                                                                                                                                            | 3 | 2   |
| b.  | (6 mark) Write a note on quartz crystal explaining in detail the different axes. Also explain X-cut and Y-cut crystals using a neat labeled diagram.                                                                                                                                                                              | 4 | 2   |
| c.  | (6 mark) Derive wavefunction and energy values for a quantum mechanical free particle moving along the positive X-direction.                                                                                                                                                                                                      | 2 | 3   |
| Q7. | (20 mark)                                                                                                                                                                                                                                                                                                                         |   |     |
| a.  | (8 mark) Explain construction and working of a ruby laser in detail                                                                                                                                                                                                                                                               | 5 | 1   |
| b.  | (6 mark) Arrive at Schrodinger's time independent equation from its time dependent form.                                                                                                                                                                                                                                          | 2 | 3   |
| c.  | (6 mark) Derive Gauss' law in differential form from its integral form.                                                                                                                                                                                                                                                           | 3 | 3   |



Bharatiya Vidya Bhavan's



**Sardar Patel College of Engineering**

(A Government Aided Autonomous Institute)

Munshi Nagar, Andheri (West), Mumbai – 400058.

**Re – End Semester Exam**

**May 2026**

**Communication Skills**

Max. Marks: 100

Class: F.Y. B. Tech (CME)

Course Code: AE BT 201

**Semester: II**

Duration: 3 Hours

Program: B. Tech

**NOTE:**

- Question number **One** is compulsory.
- Out of remaining **Six** questions attempt any four
- Please write subsections of questions in a sequence
- Draw diagrams and charts wherever necessary

14/7/26

| Sr.No     | Questions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Points | CO | BL |
|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|----|----|
| Q.1.<br>A | What are various channels of communication? Explain the difference between the formal and informal channels of communication. Briefly discuss the formal channel of communication, advantages and disadvantages.                                                                                                                                                                                                                                                                                                                          | 12     | 02 | 01 |
| Q.1.B     | Write Short Notes on any (ONE)<br>a. Content of an email and strategies to write an effective email<br>b. Semantic barriers to communication<br>c. Body language as means of non-verbal communication                                                                                                                                                                                                                                                                                                                                     | 08     | 02 | 02 |
| Q.2.<br>A | Does our culture influence our interpretation of the behaviour of those from other cultures? Explain the cultural barriers to communication in relation to values, time, space, paralanguage, colour, space distance.                                                                                                                                                                                                                                                                                                                     | 12     | 03 | 03 |
| Q.2.<br>B | What do you mean by solicited and unsolicited enquiries? Mention the steps to write an enquiry letter.                                                                                                                                                                                                                                                                                                                                                                                                                                    | 08     | 02 | 01 |
| Q.3.A     | Sardar Patel College of Engineering, Mumbai, recently purchased <b>25 Lenovo IdeaPad Slim 5 laptops</b> (Order No.: SPC/IT/2026/0412) from Lenovo India Pvt. Ltd. for use in their computer laboratory. Upon delivery and installation, the IT department discovered issues like failing to boot, defective keyboards and overheating. The delivery was also delayed 7 days beyond the promised date. The institute had made full payment in advance and expected fully functional systems as per the agreed specifications. These issues | 12     |    |    |

|            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |    |    |    |
|------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|----|----|
|            | are disrupting academic activities and scheduled lab sessions for students.<br>Write a formal complaint letter addressed to Lenovo India Pvt. Ltd., claiming a fair compensation from the company. (Use Modified Block format).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |    |    |    |
| Q.3.B      | Explain You-attitude and courtesy and consideration in business correspondence.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 08 |    |    |
| Q.4.<br>A. | Tech Nova Institute, a reputed engineering college in Mumbai, organized an <b>Inter-College Innovation Summit</b> where students were invited to present their project ideas before industry experts and investors.<br>A team of first-year students—Rohan, Aditi, and Sameer—was selected to present their project on " <i>Smart Energy Management System</i> ." While their project was technically sound, they faced challenges in communication. They did not know how to converse with other teams, they had not formally learned speaking skills, barriers to speaking, and strategies to effective speaking.<br>As a first-year student provide information on good and effective conversations, public speaking, Strategies to effective public speaking and also explain in detail the talk power program.                                                                                                                                 | 12 |    |    |
| Q.4. B     | Draw the semi-block format mentioning the compulsory and optional parts of the letter.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 08 |    |    |
| Q.5.<br>A. | The First year Engineering students at <i>Sardar Patel College of Engineering, Mumbai</i> is planning a <b>five -day industrial visit for 70 first-year students</b> as part of their academic curriculum. The faculty coordinator intends to organize this visit to <i>Tata Motors Ltd., Pune</i> , a leading automobile manufacturing company, to give students practical exposure to industrial processes. The faculty has asked you to make the necessary arrangements for the same in liaison with the above company. Write a <b>formal enquiry letter</b> to the HR/Administration Department of Tata Motors Ltd., Pune, including informing them the Purpose of the visit and academic relevance, asking them about accommodation facilities, Food, travel facilities, sightseeing for the same. Please provide complete details and ask them to send their quotation for the same within one week of the enquiry. (Use Modified Block Form) | 12 | 04 | 05 |
| Q.5.<br>B. | Explain the Johari window model in detail.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 08 | 04 | 05 |
| Q.6.<br>A. | What is the importance of non-verbal communication in business settings? How can paralanguage impact what you are saying?<br>Explain the aspects of paralanguage with examples.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 12 | 04 | 01 |
| Q.6.       | Differentiate between oral and written communication.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 08 |    |    |

|            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |    |  |  |
|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|--|--|
| B.         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |    |  |  |
| Q.7.<br>A  | <p>Case Study; An Indian IT company collaborates with a Japanese client for a software project. During virtual meetings, the Indian team members speak openly, interrupt occasionally, and express disagreement directly. However, the Japanese clients remain mostly silent and avoid direct confrontation.</p> <p>The Indian team assumes that the clients agree with their ideas. Later, the project faces delays because the client's expectations were different, but they had not explicitly voiced disagreement.</p> <p><b>Questions:</b></p> <ol style="list-style-type: none"> <li>1. Identify the type of communication barrier in this case.</li> <li>2. What cultural differences contributed to the misunderstanding?</li> <li>3. How could both teams improve cross-cultural communication?</li> </ol> | 12 |  |  |
| Q.7.<br>B. | Write an email to the Head of Department seeking permission to organize a workshop for 7 days in the college premises on Python, MATLAB, Auto CAD.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 08 |  |  |



Bharatiya Vidya Bhavan's  
**SARDAR PATEL COLLEGE OF ENGINEERING**

(Government Aided Autonomous Institute)  
Munshi Nagar, Andheri (W) Mumbai - 400058



**END SEMESTER EXAMINATION MAY 2026 / RE - EXAM JULY 2026**

Program: Civil/Mechanical/Electrical

*F.Y. B. Tech San B*

Duration: 3 hours

Course Code: BS-BTC201/BTM201/BTE201

Maximum Points: 100

Course Name: ICDN

Semester: II

Notes: 1) Use of non-programmable calculator is allowed

2) All questions are compulsory

*12/7/26*

| Q.No. | Questions                                                                                                                                | Points | CO | BL    | Module No. |
|-------|------------------------------------------------------------------------------------------------------------------------------------------|--------|----|-------|------------|
| 1a)   | Show that the length of the arc of the parabola $y^2 = 4ax$ cut off by the line $3y = 8x$ is $a \left\{ \log 2 + \frac{15}{16} \right\}$ | 06     | 3  | 3,4,5 | 3          |
| 1b)   | Evaluate $\int_0^{\infty} x e^{-x^4} dx \int_0^{\infty} \frac{e^{-x^2}}{\sqrt{x}} dx$                                                    | 06     | 3  | 2,4,5 | s.s        |
| 1c)   | Evaluate $\int \int \int x^2 yz dx dy dz$ throughout the volume bounded by $x = 0, y = 0, z = 0$ & $x + y + z = 1$                       | 08     | 3  | 3,4,5 | 5          |
| 2a)   | Evaluate $\int \int \sqrt{xy} (1 - x - y) dx dy$ over the area bounded by $x = 0, y = 0$ and $x + y = 1$ .                               | 06     | 3  | 2,4,5 | 4          |
| 2b)   | Find the area bounded by the curve $y = x^2 - 3x$ and the line $y = 2x$ and the x-axis.                                                  | 06     | 2  | 3,4,5 | 5          |
| 2c)   | Solve $\left( \frac{\log(\log y)}{x} + \frac{2}{3} xy^3 \right) dx + \left( \frac{\log x}{y \log y} + x^2 y^2 \right) dy = 0$            | 08     | 1  | 2,4,5 | 1          |
| 3a)   | Solve : $\sin x \frac{dy}{dx} + 3y = \tan \frac{x}{2}$                                                                                   | 06     | 1  | 2,4,5 | 1          |
| 3b)   | Change to polar coordinates and evaluate.<br>$\int_0^a \int_0^{\sqrt{a^2 - x^2}} e^{-x^2 - y^2} dy dx.$                                  | 06     | 2  | 4,5   | 3          |



# SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)  
Munshi Nagar, Andheri (W) Mumbai – 400058



## END-SEMESTER EXAMINATION MAY 2026 / RE - EXAM JULY 2026

|     |                                                                                                                                                                                                             |    |   |       |     |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|---|-------|-----|
| 3c) | Solve $(x^2 D^2 - xD + 4)y = \cos \log 3x + x \sin \log x$                                                                                                                                                  | 08 | 2 | 2,4,5 | 2   |
| 4a) | Prove that $\int_0^1 \sqrt{1-\sqrt{x}} dx \int_0^{1/2} \sqrt{2y-4y^2} dy = \frac{\pi}{30}$                                                                                                                  | 06 | 1 | 2,4,5 | s.s |
| 4b) | The density at any point of the cardioid $r = a(1 + \cos \theta)$ . Varies as the square of its distance from its axis of symmetry. Find its mass                                                           | 06 | 3 | 3,4,5 | 5   |
| 4c) | Using Taylor's series method find approximate value of $y$ at $x = 0.2$ for the differential equation $\frac{dy}{dx} = 2y + 3e^x$ ; $y(0) = 0$ Compare the numerical solution obtained with exact solution. | 08 | 1 | 1,4,5 | 1   |
| 5a) | Change the order of integration $\int_0^{2a} \left\{ \int_{\sqrt{2ax-x^2}}^{\sqrt{2ax}} \phi(x, y) dy \right\} dx$                                                                                          | 06 | 2 | 2,4,5 | 3   |
| 5b) | Find $y(0.2)$ by Euler method given $\frac{dy}{dx} = -xy^2$ $y(0) = 2$ if $h = 0.1$                                                                                                                         | 06 | 1 | 1,4,5 | 1   |
| 5c) | Solve $(D^5 - D)y = 12e^x + 18 \sin x - 2x^4$                                                                                                                                                               | 08 | 1 | 4,5   | 2   |
| 6a) | Change the order of integration and evaluate $\int_0^3 \left\{ \int_1^{\sqrt{4-y}} (x+y) dx \right\} dy$                                                                                                    | 06 | 2 | 4,5   | 2   |
| 6b) | Solve : $(\cos y - \sin y - x) \frac{dy}{dx} + 1 = 0$ .                                                                                                                                                     | 06 | 1 | 2,4,5 | 1   |
| 6c) | Solve numerically (using Runge - Kutta Fourth Order Formula) the differential equation, $\frac{dy}{dx} = x^2 + y^2$ with the given condition $x = 1, y = 1.5$ in the interval $[1, 1.2]$ with $h = 0.1$     | 08 | 1 | 1,4,5 | 1   |
| 7a) | Solve $\frac{di}{dt} + \frac{Ri}{L} = \frac{E}{L}$ in which the circuit has initial current $i_0$ at time $t = 0$ and emf $E = E_0 e^{-kt}$                                                                 | 06 | 3 | 3,5   | 5   |



# SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)  
Munshi Nagar, Andheri (W) Mumbai - 400058



## END SEMESTER EXAMINATION MAY 2026 / RE - EXAM JULY 2026

|     |                                                                   |    |   |     |   |
|-----|-------------------------------------------------------------------|----|---|-----|---|
| 7b) | Evaluate $\int_{-1}^1 \int_0^z \int_{x-z}^{x+z} (x+y+z) dx dy dz$ | 06 | 2 | 4,5 | 4 |
| 7c) | State and prove Duplication formula                               | 08 | 3 | 1   | 4 |