B.Tech SECOND SEMESTER EXAMINATION JUNE-2025

(Branches for NEP-2020 : CM/ME/EC/EE & for AICTE CE/CM/ME/EC/EE)

MA-2401 / MA-2301 MATHEMATICS - II

Time : Three Hours

Maximum Marks : **70**
Min. Pass Marks : **22**

Note : Attempt any five questions. Each question carries equal marks.

1(a) If $\vec{F} = x^2\,\vec{i} + xy\,\vec{j}$. Evaluate $\int_C \vec{F}\,.\,\overrightarrow{dr}$ from (0, 0) to (1, 1) along

(i) the line y = x   (ii) the parabola y = $\sqrt{x}$

(b) Apply Green's theorem in the plane to evaluate

$$\int_C [(2x^2 - y^2)dx + (x^2 + y^2)dy]$$

Where c is the curve enclosed by the x-axis and the semi-circle $x^2 + y^2 = 1$.

2(a) Change the order of integration and hence evaluate :

$$\int_0^1 \int_x^{\sqrt{2-x^2}} \frac{x}{\sqrt{x^2+y^2}}\,dy\,dx .$$

(b) Find the value of $\iiint_V z\,dx\,dy\,dz$ where V is the hemisphere $x^2 + y^2 + z^2 = a^2, z \geq 0$.

3(a) Solve $\cos x\ dy = y\,(\sin x - y)\ dx$.

(b) Solve $(D^2 - 2D + 2)y = x + e^x \cos x\,; D \equiv \frac{d}{dx}$.

4(a) Solve $(D^2 + 2D + 1)y = e^{-x}\log x$ by using method of variation of parameters.

(b) Solve $x^2 y'' - 2x(1 + x)y' + 2(1 + x)y = x^3$.

5(a) Find the power-series solution of the equation$(x^2 + 1)y'' + xy' - xy = 0$ in powers of x .

(b) Solve $(3x + 2)^2 \frac{d^2 y}{dx^2} + 3(3x + 2) - 36y = 3x^2 + 4x + 1$.

6(a) If $f(z) = u + iv$ is an analytic function and $u - v = e^x(\cos y - \sin y)$, find $f(z)$ in terms of z.

(b) Show that the function $u = \frac{1}{2}\log(x^2 + y^2)$ is harmonic and determine its conjugate. Also find$f(z)$.

7(a) Find the bilinear transformation that maps the points $z = 0, -1, i$ into the points $w = i, 0, \infty$ respectively.

(b) Find the Laurent's series expansion of $f(z) = \frac{7z-2}{z(z-2)(z+1)}$ in $1 < |z + 1 < 3|$ also find residue of $f(a)$at $z = -1$.

8(a) Evaluate $\int_0^{2\pi} \frac{d\theta}{2+\cos\theta}$ by using contour integration.

(b) Evaluate $\int_C \frac{dz}{(z^2+4)^2}$ where C is the circle $|z - i| = 2$ by using Cauchy's residue theorem.

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B.Tech SECOND SEMESTER EXAMINATION JUNE-2025

(Branch : CS/EC/EE)

CM-1401　E-WASTE MANAGEMENT

Time　:　Three Hours　　　　　　　　　　　　**Maximum Marks　:　70**
　　　　　　　　　　　　　　　　　　　　　　　　　Min. Pass Marks　:　22

Note　:　Attempt any five questions. All questions carry equal marks. Draw neat and labelled diagram whenever necessary.

1(a)　Discuss in detail about the global context scenario in the generation of E-Waste.　**07**

　(b)　Mention the effects of E-Waste pollutants on Human Health and surrounding Environment.　**07**

2(a)　Discuss in detail about the types of industries involved in the treatment and disposal of E-Waste.　**07**

　(b)　Explain in detail the term, "Extended Producers Responsibility" along with its physical Significance.　**07**

3(a)　Mention in detail about the Hazardous Waste Management Rules 2003.　**07**

　(b)　Discuss in detail about the classification of E-Waste.　**07**

4(a)　Mention in detail about the possible hazardous substance present in E-Waste.　**07**

　(b)　Discuss in detail about the Basis for Defining E-Waste.　**07**

5(a)　Discuss in detail the steps and methods to reduce E-Waste.　**07**

　(b)　Mention the salient features of third level E-Waste treatment Process.　**07**

6(a)　Discuss in detail about plastic recycling.　**07**

　(b)　Mention the salient features of integrated E-Waste recycling and management facilities.　**07**

7(a)　Mention about the categories of electrical and electronics equipment covered by WEEE directives (EU-2002a).　**07**

　(b)　Discuss in detail about Fee Trade Agreement as a means of Waste Trading.　**07**

8(a)　Discuss in detail the problems associated with the treatment of E-Waste.　**07**

　(b)　Mention about the outcomes of BAMAKO convention related to E-Waste.　**07**

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B.Tech FIRST/SECOND SEMESTER EXAMINATION JUNE-2025
(Common for All Branches)

EE-1401 / EE-1301 BASIC ELECTRICAL ENGINEERING

Time : Three Hours

Maximum Marks : **70**
Min. Pass Marks : **22**

Note : Attempt any five questions. Each question carries equal marks.

1(a) Calculate the direction and magnitude of the current through the 5Ω resistance between   **07**
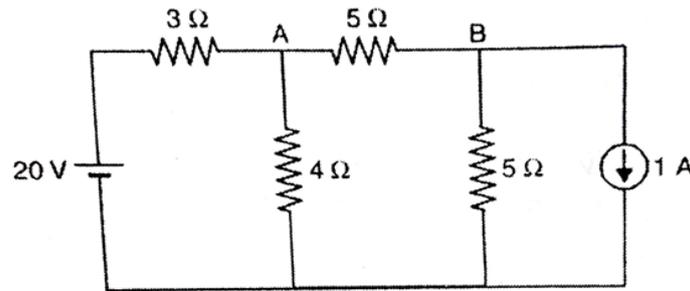point A and B by using nodal method as shown in *fig.1*.

Fig.1

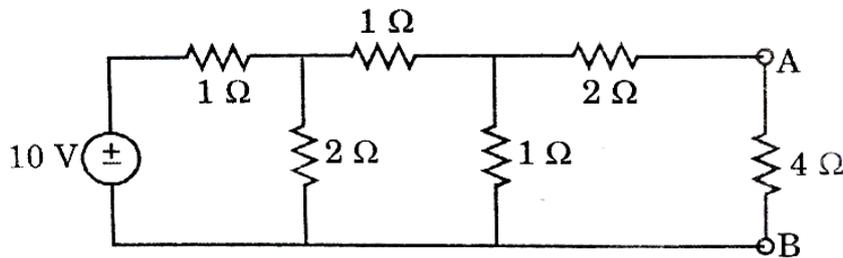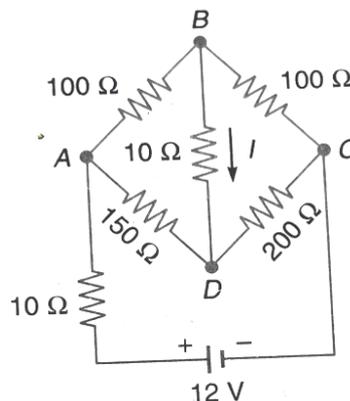(b) Find the current across AB terminal by using Thevenin's theorem of the circuit shown in   **07**
fig.2.

Fig.2

2(a) What is the superposition theorem? State and explain it, and also mention its limitations.   **07**

(b) Find the current through 10Ω resistance across BD by using mesh analysis method of the   **07**
circuit shown in *fig.3*.

3(a) Explain the following terms with the reference of an alternating quantity :   **07**

(i) Active power   (ii) Apparent Power   (iii) Reactive Power   (iv) RMS value.

(b) Draw the phasor diagrams for a R-L-C series circuit energized by a sinusoidal voltage   **07**
showing the relative positions of the current, components voltages and the applied voltage
for the following cases :   (i) $X_L > X_C$ (ii) $X_L < X_C$ (iii) $X_L = X_C$.

4(a) Write down the relation between line voltage and line current with phase voltage and phase current in star-connected circuit. **07**

(b) A chock coil of resistance 10Ω and inductance 0.05H is connected in series with a capacitor of 100 µF. The whole circuit has been connected to 200V, 50Hz supply. Determine : (i) impedance   (ii) current drawn from supply   (iii) power input (iv) power factor of circuit   (v) apparent and reactive power of the circuit. **07**

5(a) Define the following : (i) Flux   (ii) m.m.f.   (iii) flux density (iv) reluctance   (v) fringing   (vi) B-H curve **07**

(b) A steel ring of circular section of 1 cm in radius and having a mean circumference of 94.3 cm and air gap of 1 cm long. It is uniformly wound with an exciting coil consisting of 600 turns and excited with a current of 2.5 amps. Neglecting magnetic leakage. Calculate : **07**

 (i) MMF   (ii) magnetic flux   (iii) reluctance   (iv) flux density
(v) relative permeability of steel.

Assume that steel part takes about 40% of total amp-turns.

6(a) Do the comparison of electric and magnetic circuits on the basis of similarities and dissimilarities. **07**

(b) What is the working principle of a transformer? Also, draw and explain its phasor diagram for a lagging power factor load. **07**

7(a) What are the open circuit test and short circuit test? Explain their purpose and procedure. **07**

(b) A transformer is rated at 20kVA. At full load its copper loss is 400W and its iron loss is 350W. Calculate : **07**

(i) The efficiency at full load, unity p.f.
(ii) The efficiency at half load, 0.8 p.f.
(iii) The efficiency at 70% full load, 0.8 p.f.

8(a) Explain the working principle of 3-phase induction motor. Explain in detail. **07**

(b) List the different parts of a DC machine and describe the function of each. **07**

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B.Tech FIRST/SECOND SEMESTER EXAMINATION JUNE-2025
(Common for All branches)

ME-1402 ENGINEERING GRAPHICS AND CAD

Time   :   Three Hours   **Maximum Marks   :   70**
Min. Pass Marks   :   22

Note : Attempt any five questions. Assume suitable data missing, if any. Use answer book for writing CAD.

1(a) The distance between two points on a map is 5 cm. The real distance between them is 20   **07**
metres. Draw a diagonal scale to measure up to 60 m and show a distance of 43.6 m on it.

OR

Construct a scale of chords showing 5° divisions and with its aid set-off angles of 45° and
155°.

1(b) Inscribe the largest possible ellipse in a rectangle of sides 160 mm and 100 mm.   **07**

OR

The directrices of a hyperbola are 50 mm apart and the vertices are 70 mm apart. Locate
the asymptotes and foci graphically and construct two branches of the hyperbola.

2   A 70 mm long line AB is inclined at 30º to the H.P. The end A is 15 mm in front of the   **14**
V.P. and 25 mm above the H.P. The front view of the line measures 45 mm. Draw the
projections of the line AB and determine its true angle of inclination with the V.P.

3   A hexagonal plane of side 30 mm has a corner on the HP. Its surface is inclined at 45° to   **14**
the H.P. and the top view of the diagonal through the corner which is in the H.P. makes an
angle of 60° with the V.P. Draw its projections.

4   A pentagonal pyramid of base side 30 mm and axis 60 mm has an edge of base parallel to   **14**
H.P. Its axis is parallel to V.P. and inclined at 45° to the H.P. Draw its projections when
the apex lies in the H.P.

5   A pentagonal pyramid of base side 30 mm and axis 60 mm is resting on its base on the   **14**
H.P. with an edge of the base parallel to the V.P. It is cut by a section plane perpendicular
to the V.P., inclined at 60° to the H.P. and bisecting the axis. Draw its front view and
sectional top view and true shape of the section.

6   A square hole of side 25 mm is cut in a cylindrical drum of diameter 50 mm and height 70   **14**
mm. The faces of the hole are inclined at 45° to the H.P. and axis intersects with that of the
drum at right angles. Draw the development of its lateral surface.

7   Discuss the drawing and editing commands in AUTO-CAD system.   *07*

Discuss the major functions to be performed by a computer aided drafting systems and *07* advantages of CAD.

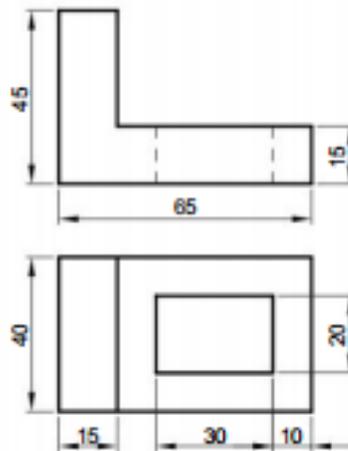8   The front and top views of an angle plate are shown in *fig.1*. Draw its isometric view.   *14*

Fig.1 *(All dimensions are in mm)*

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B.Tech FIRST/SECOND SEMESTER EXAMINATION JUNE-2025

(Common for All Branches)

EN-1401 ENGLISH

Time : Three Hours

Maximum Marks : 70
Min. Pass Marks : 22

Note : Attempt any five questions. Each question carries equal marks.

1(a) Define communication and explain its process with a suitable diagram. **04**

 (b) Discuss the different types of communication with examples. **04**

 (c) Consider a scenario where employees in a multinational company often misunderstand **06** each other's emails due to differences in language and cultural expressions. Identify the type of barrier this represents and suggest measures to overcome it.

2(a) Explain the importance of phonetics in effective communication. **04**

 (b) What are the etiquettes to be followed during a telephonic conversation? **04**

 (c) Prepare a short oral presentation (2-3 minutes) on "The Role of Technology in Modern **06** Communication" for a group of first-year engineering students. Explain how you would use phonetics to enhance your delivery.

3(a) What are soft skills? Why are they essential for professional excellence? **04**

 (b) Differentiate between interpersonal and intrapersonal communication. **04**

 (c) Analyze the following case study and discuss the communication strategies used by the **06** leader :

Case Study :

In a civil engineering firm, a team of five engineers was assigned to design a small bridge for a local community. The team leader, Rudra Sharma, observed that the structural engineers and the environmental impact analysts were not collaborating effectively, leading to delays and conflicting design proposals. To improve communication, Rudra implemented the following strategies :

(i) Organized weekly cross-functional meetings where each subgroup presented their progress and challenges.
(ii) Set up a shared digital workspace for real-time access and feedback on each other's work.
(iii) Encouraged informal coffee breaks for casual discussions among team members. Within a month, the team developed a cohesive design that met all requirements and was approved by the client.

Discuss how these strategies will contribute to the team's success.

4(a) Explain the concept of time management. **04**

 (b) Create a weekly time management plan for a first-year engineering student who needs to **04** balance exam preparation, a group project, and extracurricular activities. Include specific techniques such as prioritization, scheduling, and avoiding procrastination.

 (c) How can self-awareness contribute to personal and professional growth? **06**

5(a) What are the characteristics of a formal letter? *04*

 (b) Explain the importance of email etiquette in business communication. *04*

 (c) You purchased a laptop from XYZ Electronics, but it stopped working after one month. *06* Despite contacting customer service, you have not received a satisfactory response. Write a complaint letter to the company's manager.

6(a) Describe the format of a résumé. *04*

 (b) What are the key points to keep in mind while writing a quotation letter? *04*

 (c) Write an application letter for the post of Junior Engineer at ABC Construction Company. *06* In your letter, highlight the communication skills you have learned in this course that make you a suitable candidate.

7(a) What is précis writing? Explain its significance. *04*

 (b) Differentiate between a lab report and a survey report. *04*

 (c) Write a technical description of the process of 3D printing in about 150 words. *06*

8(a) Write a slogan to promote renewable energy adoption. *04*

 (b) List six components of a technical report. *04*

 (c) Write a short project report on designing a solar-powered water heater for a rural *06* community. Include the abstract, introduction, methodology, results and conclusion.

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