3E1206

3E1206

B.Tech. III-Sem. (Main & Back) Examination, January/February - 2024

Agriculture Engineering

3AG2-01 Advance Engineering Mathematics - I

AN,AG,AE,CE,CR,EC,EI,ME,MH,PT

Time : 3 Hours **Maximum Marks : 70**

Instructions to Candidates:

Attempt all Ten questions from Part A, Five questions out of Seven questions from Part B and Three questions out of Five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/ Calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No.205)

PART - A

(Answer should be given up to 25 words only)

All questions are compulsory. **(10×2=20)**

1. Show $\Delta^3 y_2 = \nabla^3 y_5$.

2. Show that $\Delta^2 e^x = (e-1)^2 e^x$; interval of differencing being unity.

3. Write the formulae of Trapezoidal rule and simpson 1/3 rule.

4. Using Euler method find the value of y(0.025). Given $\frac{dy}{dx} = x + y + xy; y(0) = 1$ and step size $h = 0.025$.

5. Find the inverse Laplace transform of $\frac{1}{s(s^2+1)}$

6. *If L(F(t)) = f(S) then find the Laplace Transform of F'(t).*

7. Write the formulae of Fourier sine transform and inverse Fourier sine transform.

8. If $F_c[f(x,t)] = \overline{f}(s,t)$ then write $F_c\left[\dfrac{\partial^2 f(x,t)}{\partial x^2}\right]$

9. State convolution theorem for Z - transform.

10. Find $Z(n)$.

PART - B

(Analytical/Problem solving questions)

Attempt any Five questions. $\hspace{3cm}$ (5×4=20)

1. Show $\Delta\tan^{-1}\left(\dfrac{n-1}{n}\right) = \tan^{-1}\left(\dfrac{1}{2n^2}\right)$, interval of differencing being unity.

2. The distance covered by an athlete for the 50 meter race is given in the following table.

Time (Seconds)	0	1	2	3	4	5	6
Distance (meters)	0	2.5	8.5	15.5	24.5	36.5	50

Determine the speed of the athlete at t = 5 sec.

3. Find $L(\sin\sqrt{t})$ and hence obtain $L(\cos\sqrt{t}\,/\,\sqrt{t})$.

4. Find $\displaystyle\int_0^\infty\left(\dfrac{e^{-t}-e^{-3t}}{t}\right)dt$

5. Find the Fourier Transform of the following

$$f(x) = \begin{cases} 1-x^2 ; |x| \le 1 \\ 0 \quad ; |x| > 1 \end{cases}$$

6. Solve the following Integral equation

$$\int_0^\infty f(t)\cos\alpha t\ dt = \begin{cases} 1-\alpha & 0 \le \alpha \le 1 \\ 0 & ,\alpha > 1 \end{cases},$$

7. Use convolution theorem to show that $Z^{-1}\left\{\dfrac{z(z+1)}{(z-1)^3}\right\} = n^2$

PART - C

(Descriptive/Analytical/Problem Solving/Design question)

Attempt any Three questions.   **(3×10=30)**

1. From the following table find $f'(6)$

x	0	2	3	4	7	9
f(x)	4	26	58	112	466	922

2. Use Milne's Method to obtain the solution of the equation $\dfrac{dy}{dx} = x - y^2$ at $x = 0.8$ *and at* $x = 1$ given that $y(0) = 0$.

3. Prove $L\left\{\dfrac{Sin^2 t}{t}\right\} = \dfrac{1}{4}\log\left(\dfrac{S^2 + 4}{S^2}\right)$ and hence deduce the integral

$$\int_0^\infty \frac{\sin^2 t}{t^2} dt$$

4. Prove $e^{-x}\cos x = \dfrac{2}{\pi}\displaystyle\int_0^\infty \dfrac{\left(\lambda^2 + 2\right)\cos\lambda x}{\left(\lambda^4 + 4\right)} d\lambda$

5. Solve the following difference equation by using Z - transform

$$u_{n+2} - u_{n+1} + u_n = n^2 2^n, \quad u_0 = u_1 = 0$$

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3E1207

3E1207

B.Tech. III-Sem. (Main & Back) Examination, January/February - 2024

Automobile Engineering

3AE3-04 Engineering Mechanics

AE, ME

Time : 3 Hours   **Maximum Marks : 70**

Instructions to Candidates:

Attempt all Ten questions from Part A, Five questions out of seven questions from Part B and Three questions out of Five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/Calculated must be stated clearly. Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

PART - A

(Answer should be given up to 25 words only)

All questions are compulsory.   **(10×2=20)**

1. State the principle of transmissibility of forces.

2. State the Varignon's principle of moments.

3. Explain the conditions of equilibrium.

4. What are the assumptions made, while finding out the forces in the various members of a framed structure?

5. Distinguish between center of gravity and centroid.

6. Explain reversibility of a machine.

7. Explain the angle of friction.

8. Distinguish between the motion and velocity.

9. State the D'Alembert's principle of motion.

10. State the law of conservation of energy.

PART - B

(Analytical/Problem solving questions)

Attempt any Five questions.   **(5×4=20)**

1. State and prove the Lami's theorem.

2. Explain the assumptions used in the analysis of frames.

3. A beam AB of span 10 m carries two point loads of 20 kN and 3OkN at 4 m and 6 m from the end A, respectively. Calculate the reactions of the beam by the principle of virtual work.

4. Calculate the distance of centroid from 1-1 line of lamina as shown in figure.
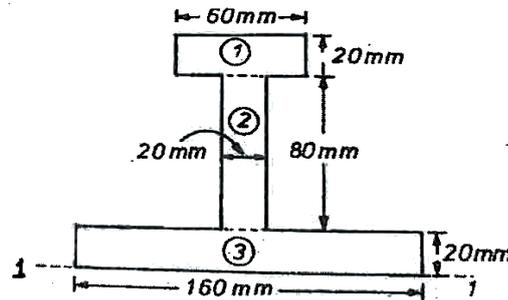
5. In a lifting machine, an effort of 15 N raised a load of 750 N. Calculate the mechanical advantage. Also calculate the velocity ratio if the efficiency at this load is 50%.

6. Calculate the power transmitted by a belt running over a pulley of 800 mm diameter at 300 rpm. The coefficient of friction between the pulley and belt is 0.20, angle of lap 180° and maximum tension in the belt is 2 kN.

7. A flywheel of mass 8 tonnes starts from rest, and gets up a speed of 180 r.p.m. in 3 minutes. Calculate the average torque exerted on it, if the radius of gyration of the flywheel is 60 cm.

PART - C

(Descriptive/Analytical/Problem Solving/Design question)

Attempt any three questions   **(3×10=30)**

1. ABCD is a square. Forces of 10, 8 and 4 units act at A in the directions AD, AC and AB respectively. Using the analytical method, determine: **(5+5=10)**

    i)   Resultant force in magnitude and direction

    ii) Magnitude and sense of two forces along the directions AJ and AH, where J and H are the mid-points of CD and BC respectively, which together will balance the above resultant.

2. Derive an expression for length of an open belt for the power transmission.

3. Calculate the moment of inertia of the shaded portion as shown in figure about its centroidal axes.
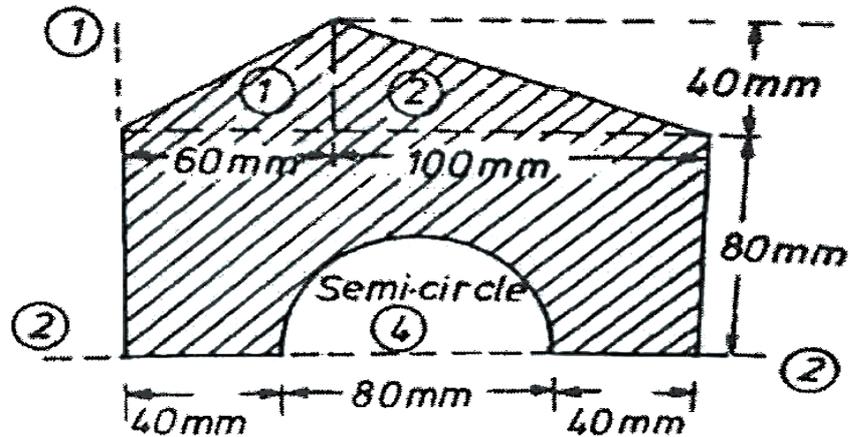
4. A uniform ladder of weight 200 N and length 5m is placed against a vertical wall in a position where its inclination to the vertical is 30^0. A man weighing 650 N climbs the ladder. At what position will he induce slipping? The coefficient of friction for both the contact surfaces of the ladder is 0.3.

5. A hammer of mass 1200 kg drops from a height of 0.80m on a pile of 600 kg. Find

   a) The common velocity pile and pile hammer after impact,

   b) The average resistance of the ground if the pile comes to rest after penetrating 60 mm into the ground.

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3E1213

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B.Tech. III-Sem. (Main & Back) Examination, January/February - 2024
Civil Engg.
3CE3-04 Engineering Mechanics
3E1213

Time : 3 Hours **Maximum Marks : 70**

Instructions to Candidates:

Attempt all Ten questions from Part A, Five questions out of seven questions from Part B and Three questions out of five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/ Calculated must be stated clearly. Use of following supporting material is permitted during examination. (Mentioned in form No.205)

PART - A

(Answer should be given up to 25 words only)

All questions are compulsory **(10×2=20)**

1. State Lami's theorem.

2. Define 'zero force member' in a truss.

3. Define coplanar, collinear, and concurrent forces.

4. Write down the assumption used in the analysis of pin-jointed frames.

5. Define the complementary shear stress.

6. State the parallel axis theorem of the moment of inertia.

7. State the principle of virtual work.

8. Define the angle of friction and coefficient of friction.

9. Define the modulus of rigidity and bulk modulus.

10. What is the parallelogram law of forces?

PART - B

(Analytical/Problem solving questions)

**Attempt any Five questions**   **(5×4=20)**

1. Draw and explain the stress-strain curve of mild steel in tension showing all its principal points.

2. Explain the difference between perfect, deficient, and redundant trusses with example.

3. A sphere of weight 100 N is tied to a smooth wall by a string as shown in the figure. The string makes an angle of 15° with the vertical wall. Calculate the tension 'T' in the string and reaction 'R' of the wall.
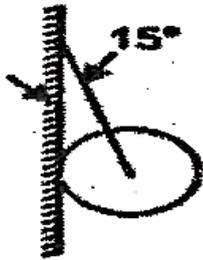
4. Determine the resultant of forces shown in the figure below:
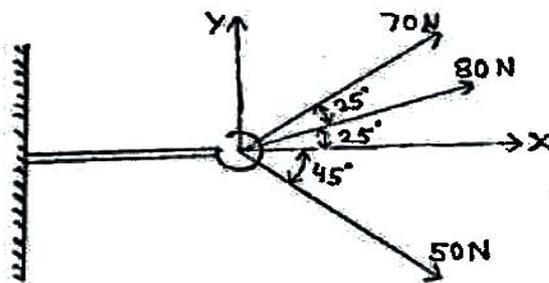
5. State and prove the 'law of conservation of energy'.

6. By the Principle of virtual work, determine the reactions for the beam shown in the figure below.
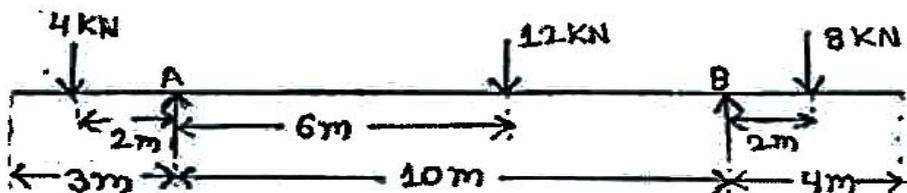
7. Define the terms:

    i)   Centre of gravity.

    ii)   Centroid.

    iii) Polar moment of inertia.

    iv) Radius of gyration.

PART - C

(Descriptive/Analytical/Problem Solving/Design questions)

Attempt any three questions   (3×10=30)

1. A circular rod of 25 mm diameter and 50 mm long is subjected to a tensile force of 60 KN. Determine the modulus of Rigidity, Bulk modulus, and change in volume if Poisson's ratio = 0.3 and Young's modulus $E = 2 \times 10^5$ N/mm².

2. Find the forces in all the members of the truss shown in the figure and tabulate the results.
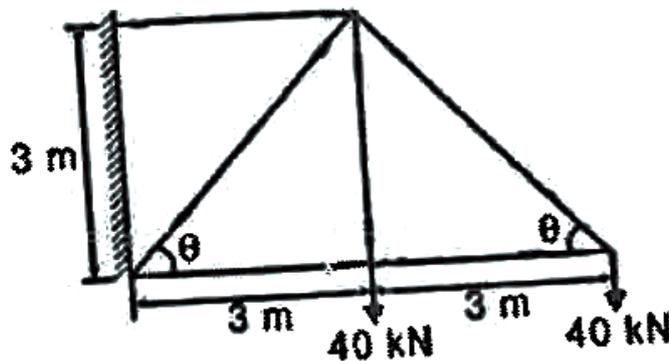
3. Determine the moment of inertia of the section shown in the figure about an axis passing through the centroid and parallel to the topmost fiber of the section. Also, determine the moment of inertia about the axis of symmetry. Hence find the radius of gyration.
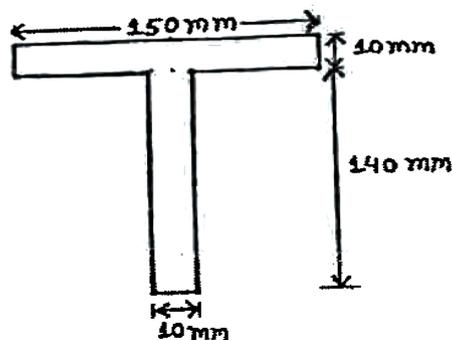
4. A rough inclined plane with the coefficient of friction (μ) = 0.2, rises 1 cm for every 5 cm of its length. Calculate the effort required to drag a body weighing 100 N up the plane;

    i)   when the effort is applied horizontally.

    ii)   when the effort is applied parallel to the plane.

5. a)   Differentiate between open-coiled and close-coiled helical springs.

    b)   A close-coiled helical spring is subjected to an axial pull of 600 N. The spring is made out of a 16mm diameter rod, and has 12 complete coils, each of mean diameter 120mm. Compute

        i)   deflection under the pull, and

        ii)   energy stored in the spring during extension. The modulus of rigidity of the material of spring is (G) = 0.85×10^5 N/mm^2.

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3E1213 (4)

3E1214

3E1214

B.Tech. III-Sem. (Main and Back) Examination, January/February- 2024

Civil Engg.

3CE4-06 Fluid Mechanics

Time : 3 Hours **Maximum Marks : 70**

Instructions to Candidates:

Attempt all Ten questions from Part A, Five questions out of Seven questions from Part B and Three questions out of Five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/ Calculated must be stated clearly. Use of following supporting material is permitted during examination. (Mentioned in form No.205)

PART - A

(Answer should be given up to 25 words only)

All questions are compulsory. **(10×2=20)**

1. Define fluid. What is fluid continuum?

2. Differentiate between Newtonian and non-Newtonian fluids.

3. Differentiate between specific weight and specific gravity.

4. What is difference between Gauge pressure and Vacuum pressure?

5. Define total pressure and centre of pressure.

6. Explain the conditions of equilibrium for floating and submerged bodies.

7. Define and discuss types of fluid flow.

8. What do you mean by discharge?

9. Define

    i)   Displacement thickness and

    ii)   Momentum thickness.

10. What is a siphon?

PART - B

(Analytical/Problem solving questions)

Attempt any Five questions.   **(5×4=20)**

1. The shear stress at a point in oil of density 800 kg/m³ is 0.25 N/m² and the rate of shear strain at that point is 0.15 per second, Determine its kinematic viscosity in stoke.

2. A simple u-tube manometer is installed across an orifice -meter. the manometer is filled with mercury (Specific gravity = 13.6) and the liquid above mercury is carbon tetrachloride. (specific gravity = 1.6). If the manometer reads 200 mm, then determine the pressum difference over the manometer.

3. A 10mm water jet leaves the tip of the nozzle fitted at the end of a pipe with 10 m/s velocity in the vertically upward direction. If there is no energy loss and jet remains circular, then determine its diameter at a point 3m above the nozzle tip.

4. Define and obtain an expression for continuity equation in a 3-D flow .

5. Derive Euler's equation of motion.

6. State and derive impulse-momentum equation for steady flow.

7. Obtain an expression for the Hagen poiseuille equation.

PART - C

(Descriptive/Analytical/Problem Solving/Design question)

Attempt any Three questions.   **(3×10=30)**

1. Derive Navier-stokes equations.

2. A crude oil of viscosity 0.14 Ns/m^2 and relative density 0.92 flows through a 25 mm diameter vertical pipe. If the pressure gauge fixed at 15m apart measure 540 kN/m^2 and 180 kN/m^2, the lower value of the gauge is at the higher level then determine the direction and rate of flow through pipe.

3. Write short notes on the following.

    i)   Venturi-meter

    ii)   Orificemeter

    iii)   Vorticity and circulation

    iv)   Laminar and turbulent flow.

4. Define buoyancy, centre of buoyancy metacentre and metacentric height.

5. State and prove Bernoulli's equation. Also give assumptions, limitations and its applications.

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3E1215

3E1215

B.Tech. III-Sem. (Main & Back) Examination, January/February - 2024

Civil Engg.

3CE4-05 Surveying

Time : 3 Hours **Maximum Marks : 70**

Instructions to Candidates:

Attempt all ten questions from Part A, five questions out of seven questions from Part B and three questions out of five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/ Calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No.205)

PART - A

(Answer should be given up to 25 words only)

All questions are compulsory. **(10×2=20)**

1. What is surveying?

2. What is the use of theodolite?

3. Define transition curve.

4. What is the least count of theodolite and levelling staff?

5. What do you mean by contour interval?

6. What is terrestrial photogrammetry?

7. What is bench mark?

8. What is mean sea Level?

9. Define laying out of building.

10. What is E.D.M?

PART - B

(Answer should be given up to 100 words only)

Attempt any Five questions   **(5× 4 = 20)**

1. Differentiate between prismatic and surveyour's compass.

2. The length of a line measured with a 20 metre chain was found to be 240 meters calculate the true length of line if the claim was 10 cm too long.

3. a) Convert the following whate circle bearing to quadrantal bearings

   i) $32^0\ 30'$

   ii) $170^012''$

   iii) $212^054'$

   b) Convert the following quadrantal bearing to whole circle bearings

   i) $S31^035'E$

   ii) $S68^05'\ W$

4. Describe various types of curves.

5. What is tilt distortion ? Explain

6. Write down characteristics of contours.

7. Write a short note on Terrestrial photogrammetry.

PART - C

(Descriptive/Analytical/Problem Solving/Design question)

Attempt any Three questions.   **(3×10=30)**

1. Describe various types of tape corrections.   **(10)**

2. It was required to ascertain the elevation of two paints p and Q and a line of levels was run from P to Q. The levelling was the continued toa bench mark of 83.500. the readings obtained being as shown below. **(10)**

Obtain the R.L of P and Q.

B.S	I.S	F.S	R.L	Remarks
1.622				P
1.874		0.360		
2.032		1.790		
	2.362			Q
0.984		1.120		
1.906		2.824		
		2.136	83.500	B.M

3. a) Define Super-elevation. **(4)**

   b) A transition curve is required for a circular Curve of 200 metre radius, the guage being 1.5m and maximum superelevantion restricted to 15cm. The transiton is to be designed for a velocity such that no lateral pressure is imposed on the rails and the rate of gain of radial acceleration is 30 cm/sec^2. calculate the required length of the transition curve and the design speed. **(6)**

4. Describe the stadia system of tacheometry. **(10)**

5. Explain the termporary adjustment of transit theodalite. **(10)**

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3E1200

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B.Tech. III-Sem. (Main & Back) Examination, January/February- 2024

Agricultural Engineering

3AG 1-03 Managerial Economics and Financial Accounting

All Branches

Time : 3 Hours **Maximum Marks : 70**

Instructions to Candidates:

Attempt all ten questions from Part A, five questions out of seven questions from Part B and three questions out of five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/ Calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No.205)

PART - A

(Answer should be given up to 25 words only)

All questions are compulsory **(10×2=20)**

1. Explain Gross Domestic Product (GDP).

2. Draw circular flow of economic activities

3. Draw graph to show

 a) Perfectly Inelastic Demand

 b) Perfectly elastic demand **(1 + 1=2)**

4. What is Giffen Paradox?

5. Give mathematical form of Cobb - Douglas production function.

6. Define Explicit and implicit costs with example. **(1 +1= 2)**

7. Draw a chart to show different market structures.

8. List four important features of Monopoly market. **(0.5 × 4 = 2)**

9. What is golden rule of accounting for real accounts? **(1 +1 =2)**

10. Define payback period.

PART - B

(Analytical/Problems solving questions)

Attempt any Five questions **(5×4 =20)**

1. Define National Income. Explain steps involved in the estimation of national income by income method. **(1+3=4)**

2. Explain economies and diseconomies of scale with examples. **(2+2=4)**

3. How will you calculate cash flows from operating activities by direct and indirect method. Explain with example. **(2+2=4)**

4. a) Why is the demand curve of a firm under monopolistic competition more elastic than under monopoly? Explain.

    b) Explain 'freedom of entry and exit to firms in industry' feature of monopolistic competition. **(2+2=4)**

5. Explain following with help of suitable graph. **(1×4=4)**

    a) Zero income elasticity

    b) Negative Income elasticity

    c) Unit incom elasticity

    d) Income elasticity greater than unity

6. Give brief answer of following Questions on Balance Sheet: **(1×4=4)**

    a) On balance sheet, accruals, notes payable, and account payable are listed under which category?

    b) Inventories, cash and equivalents, and accounts receivables are listed as?

    c) A firm buys products but does not pay to suppliers instantly. This is recorded as?

    d) In a balance sheet, the total of common stock and retained earnings are denoted as?

7. Explain following ratios: (Formula is must) **(2+2=4)**

    a) Liquidity Ratio

    b) Solvency Ratio

PART - C

(Descriptive/Analytical/Problems Solving/Design question)

Attempt any Three questions **(3×10=30)**

1 a) Complete the following table: **(0.25×30 =7.5)**

QTY (UNITS)	TFC (Rs.)	TVC (Rs.)	TC (Rs.)	AVC (Rs.)	ATC (Rs.)	MC (Rs.)
0	60	.....	.....	.....	.....	.....
1	.....	30	.....	.....	.....	.....
2	.....	.....	100	.....	.....	.....
3	.....	.....	.....	.....	.....	5
4	.....	.....	.....	.....	28.75	.....
5	.....	.....	.....	15	.....	.....

b) Draw graph/graphs showing relationship between any five Costs with Quantity (Units).

You can show them in single graph or in separate five graphs. **(0.5×5=2.5)**

2. Calculate and also comment on degree of elasticity: **(4×2.5=10)**

a) The price of tea per cup is decreased from Rs. 4 to Rs.3 and the demand of coffee is increased from 2 cups per day to 4 cups per day. Calculate Cross Elasticity of Demand.

b) Mr. Gupta's income is raised from Rs. 10,000 to Rs. 15,000 and the demand for good A is raised from 500 to 800 units. Calculate Income Elasticity of Demand.

c) The demand of commodity X is raised from 200 to 250 units when price decreased from Rs. 8 to Rs. 6. Calculate Price Elasticity of Demand.

d) If the price rises of good A rises from Rs. 20 to Rs. 30. Its supply increases from 200 to 800 units. Calculate Elasticity of Supply.

3. "Economics is an art." Elaborate this statement by explaining meaning, nature and scope of Economics. **(2+4+4=10)**

4. "A competitive firm is not a price maker, but adjustor." Explain this statement with reference to price determination in long and short term under perfect competition.

(4+6=10)

5. From the following balance sheet of Brown and co. Ltd. as on 31ˢᵗ Dec. 2020 and 31ˢᵗDec.2021:

Liabilities	2020 (Rs.)	2021 (Rs)	Asset	2020 (Rs.)	2021 (Rs.)
Share capital	5,00,000	7,00,000	Land & Building	80,000	1,20,000
Profit & loss a/c	1,00,000	1,60,000	Plant & Machinery	5,00,000	8,00,000
General Reserve	50,000	70,000	Stock	1,00,000	75,000
Sundry creditors	1,53,000	1,90,000	Sundry Debtors	1,50,000	1,60,000
Bills payable	40,000	50,000	Cash at Bank	20,000	20,000
Expenses O/S	7,000	5,000			
TOTAL	8,50,000	11,75,000	TOTAL	8,50,000	11,75,000

Additional Information:

a) Rs. 50,000 depreciation has been charged on Plant and Machinery during 2021.

b) A piece of Machinery was sold for Rs. 8,000 during the year 2021. It had cost Rs. 12,000; depreciation of Rs. 7,000 had been provided on it.

Prepare a Schedule of changes in Working Capital and a Statement showing the Sources and Application of Funds for 2021. **(3+3+2+2=10)**

(Show Adjusted Profit & Loss Account and Plant & Machinery Account in working notes.)

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3E1250

3E1250

B.Tech. III-Sem. (Main & Back) Examination, January/February - 2024

Agricultural Engineering

3AG1-02/Technical Communication

All Branches

Time : 3 Hours   **Maximum Marks : 70**

Instructions to Candidates:

*Attempt all **Ten** questions from Part A, **Five** questions out of **Seven** questions from Part B and **Three** questions out of **Five** questions from Part C.*

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/ Calculated must be stated clearly.

*Use of following supporting material is permitted during examination. (Mentioned in form **No. 205**)*

PART - A

(Answer should be given up to 25 words only)

All questions are compulsory.   **(10×2=20)**

1. What are various aspects of technical communication?

2. Write two importance of technical communication.

3. Define style in technical communication.

4. What are various steps to read a technical text?

5. List the benefits of note - making.

6. Name different technical texts.

7. Correct the following sentences.

   i) Both the sister were seen at the party.

   ii) She is one of the best student in our class.

8. Form two words by using the each prefix - in and - un.

9. Underline and rewrite the noun phrase in the following sentences.

    i)   The cat with the stripes tried to trip me.

    ii)   My green gym socks are in the hamper.

10. Write a short note on Linguistic Ability.

PART - B

(Analytical/Problem solving questions)

Attempt any Five questions.   **(5×4=20)**

1. Explain ERRQ and SQ3R Reading Technique.

2. Reading makes a man complete francis Bacon. How can you develop effective reading skills?

3. What is the process of reading a technical manual?

4. Elaborate various ways to collect information.

5. Enlist various factors which affect designing of a document.

6. What are various types of technical articles? Explain.

7. Enumerate the different characteristics of technical project proposal.

PART - C

(Descriptive/Analytical/Problem Solving/Design question)

Attempt any Three questions.   **(3×10=30)**

1. Explain various types of note-making.

2. Describe various features of style in technical communication.

3. Assume yourself as the cultural secretary, you are organizing an instrument playing programme in your Institute/College/ University. Draft an e-mail informing all the teachers, students and staff members of your College about the event and invite them to attend the event. Invent the necessary details.

4. Assuming yourself a hostler, write minutes of the meeting, which you have attended with the hostel wardern and chief warden to improve the quality of food served in the hostel mess.

5. Prepare a report on the Campus placement Drive organized in your College on 12th Jan. 2023.

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