11N505

11N505

B. Tech. I - Sem. (New Scheme) (Main) Exam., May - 2023
All Branch
1FY3 – 05 Managerial Economics and Financial Accounting
Common to all Branches

Time: 3 Hours

Maximum Marks: 70

Instructions to Candidates:

Part – A: Short answer questions (up to 25 words) 10 × 2 marks = 20 marks. All ten questions are compulsory.

Part – B: Analytical/Problem solving questions 5 × 4 marks = 20 marks. Candidates have to answer five questions out of seven.

Part – C: Descriptive/Analytical/Problem Solving/Design questions 3 × 10 marks = 30 marks. Candidates have to answer three questions out of five.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may 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)

1. Simple Calculator

2. NIL

PART – A

Q.1 What do you mean by price elasticity? Enlist types of price elasticity.   [2]

Q.2 Distinguish between a movement along the demand curve and shift in a demand curve.   [2]

Q.3 Differentiate between accounting profit and economic profit.   [2]

Q.4 Define fixed cost and variable cost.   [2]

Q.5   Explain concept and use of break-even Analysis.   [2]

Q.6   What do you mean by Money Measurement Concept?   [2]

Q.7   Give significance of earning per share.   [2]

Q.8   State two characteristics of debentures.   [2]

Q.9   Differentiate between short run and long run.   [2]

Q.10   Differentiate between explicit cost and implicit cost.   [2]

PART – B

Q.1   How is managerial economics related to different disciplines?   [4]

Q.2   Variable cost per unit, selling price per unit and fixed expenses are 15, 20 and

54,000, respectively. Find out break-even point per unit.   [4]

Q.3   Explain the factors on which the demand for a commodity depends.   [4]

Q.4   Explain returns to scale briefly. https://www.btubikaner.com   [4]

Q.5   Discuss chief characteristics of joint stock company in detail.   [4]

Q.6   Explain the main features of Monopolistic competition.   [4]

Q.7   From the following particulars calculate current ratio and quick ratio.   [4]

Particulars	Amount	Particulars	Amount
Inventory	1,40,000	Creditors	3,00,000
Sundry Debtors	2,80,000	Bank Overdraft	50,000
Cash	50,000		
Bill Receivables	20,000		

PART – C

Q.1 Discuss advantages and limitations of accounting in detail. [10]

Q.2 What are isoquants? Explain the types and properties of isoquants in detail. [10]

Q.3 What is demand curve? Explain law of demand along with its chief characteristics and exceptions in detail. [10]

Q.4 Differentiate between the different forms of market structure. [10]

Q.5 Journalise the following transactions in the books of Shyam. [10]

	₹
Business started with cash	1,00,000
Goods purchased for cash	25,000
Goods purchased from Pankaj on credit	18,000
Goods sold no Naresh on credit	9,000
Good returned to Pankaj	12,000
Goods returned to Naresh	1,400
Cash paid to Ajay	6,000
Commission received	2,700
Furniture purchased	7,000
Rent paid to Amit	5,000
Sold goods to Sumit for cash	6,000
Cash sales	7,000
Cash received from Naresh on account	5,000
Salaries paid	10,000
Machinery purchased	20,000

11N503

B. Tech. I - Sem. (New Scheme) (Main) Exam., May - 2023
All Branch
1FY1 – 03 Engineering Chemistry
Common to all Branches

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

Instructions to Candidates:

Part – A: Short answer questions (up to 25 words) 10 × 2 marks = 20 marks. All **ten** questions are compulsory.

Part – B: Analytical/Problem solving questions 5 × 4 marks = 20 marks. Candidates have to answer **five** questions out of **seven**.

Part – C: Descriptive/Analytical/Problem Solving/Design questions 3 × 10 marks = 30 marks. Candidates have to answer **three** questions out of **five**.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may 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)

1. NIL _____   2. NIL _____

PART – A

Q.1   What is total hardness of water?   [2]

Q.2   What are boiler scales? Enlist their disadvantages.   [2]

Q.3   Mention application of soda lime glass and potash glass.   [2]

Q.4 Why is Portland cement so called? [2]

Q.5 Advantages of biofuels. [2]

Q.6 Enlist types of renewable energy. [2]

Q.7 Mention classification of coal with % of carbon in them. [2]

Q.8 Proximate analysis of coal and its applications. [2]

Q.9 What are green solvents? [2]

Q.10 What is synthetic petrol? [2]

PART – B

Q.1 Discuss fluid lubrication. [4]

Q.2 Discuss caustic embrittlement. [4]

Q.3 Draw flow diagram of steps involved in cement manufacture by Rotary Kiln technology. [4]

Q.4 Give a short account of fluid film lubrication and boundary lubrication. [4]

Q.5 What are secondary fuels? What are their important characteristics? [4]

Q.6 Write note on biomass as source of energy. [4]

Q.7 Why is coke and not coal used as a fuel in metallurgical industry? [4]

PART – C

Q.1 'Corrosion can be considered as the reverse of process of metal extraction'.

Justify the statement. [10]

Q.2 What is glassy state of matter? Why is annealing important in glass manufacture? Write about importance of pure silica glass. [10]

Q.3 Define lubricants. Discuss classification of lubricants with suitable examples. • [10]

Q.4 What is green chemistry? Enlist the principles of green chemistry. What are the advantages of green chemistry? [10]

Q.5 A coal sample has following analysis: $C = 66.2\%$, $H = 4.2\%$, $O = 6.1\%$, $N = 1.4\%$, $S = 2.9\%$, moisture = 9.7% and 9.5% ash. If 1.0 kg of coal is burnt with 25% excess air, determine the quantity of combustion products. [10]

11N509

B. Tech. I - Sem. (New Scheme) (Main) Exam., May - 2023
All Branch
1FY2 – 09 Elements of Mechanical Engineering
Common to all Branches

Time: 3 Hours

Maximum Marks: 70

Instructions to Candidates:

Part – A: Short answer questions (up to 25 words) 10 × 2 marks = 20 marks. All **ten** questions are compulsory.

Part – B: Analytical/Problem solving questions 5 × 4 marks = 20 marks. Candidates have to answer **five** questions out of **seven**.

Part – C: Descriptive/Analytical/Problem Solving /Design questions 3 × 10 marks = 30 marks. Candidates have to answer **three** questions out of **five**.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may 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)

1. **NIL** _____

2. **NIL** _____

PART – A

Q.1 Give the limitations of the first law of thermodynamics.

Q.2 Differentiate between path and point functions.

Q.3 Define one ton of refrigeration.

Q.4 Classify engineering materials.

Q.5 Draw the P.V. diagram of a simple vapor compression refrigeration cycle.

Q.6 What is the range of compression ratio for S.I. and diesel engines?

Q.7 What is meant by the calorific value of a fuel?

Q.8 What are the defects in welds?

Q.9 Define cold working of metals.

Q.10 State Carnot theorem.

PART – B

Q.1 An irreversible heat engine extracts heat from a high – temperature source at a rate of 100 kW and rejects heat to a sink at a rate of 50 kW. The entire work output of the heat engine is used to drive a reversible heat pump operating between a set of independent isothermal heat reservoirs at 17°C and 75°C. What is the rate (in kW) at which the heat pump delivers heat to its high-temperature sink?

Q.2 Differentiate between two-stroke and four-stroke I.C. engines.

Q.3 Explain turbocharging and supercharging in S.I. engines.

Q.4 Mention the various processes in the diesel cycle and dual cycle.

Q.5 Why is the Brayton cycle used in gas turbines?

Q.6 Explain the gas welding process.

Q.7 Write short notes on ductility, annealing and toughness.

PART – C

Q.1 (i) A heat pump operates on a Carnot heat pump cycle with a C.O.P. of 8.7. It keeps a space at 24°C by consuming 2.15 kW of power. Determine the temperature of the reservoir from which the heat is absorbed and the heating load provided by the heat pump.

(ii) An inventor claims to have developed a refrigeration system that removes heat from the closed region at -12°C and transfers it to the surrounding air at 25°C while maintaining a C.O.P. of 6.5. Is this claim reasonable? Explain.

Q.2 A Carnot refrigerator system has a working temperature of -30°C and 40°C. What is the maximum C.O.P. possible? If the actual C.O.P. is 75% of maximum, calculate the actual refrigeration effect produced per kWh and the capacity of the system.

Q.3 Estimate the loss in air standard efficiency for the diesel engine for the compression ratio 14 and the cutoff changes from 6% to 13% of the stroke.

Q.4 Discuss the various metal forming processes in detail.

Q.5 An engine running at 150 r.p.m. drives a line shaft by means of a belt. The engine pulley is 750 mm in diameter and the pulley on the line shaft is 450 mm. A 900 mm diameter pulley on the line shaft drives a 150 mm diameter pulley keyed to a dynamo shaft. Find the speed of the dynamo shaft when;

1. there is no slip, and

2. there is a slip of 2% at each drive.

11N507

B. Tech. I - Sem. (New Scheme) (Main) Exam., May - 2023
All Branch
1FY2 – 07 Basic Electrical Engineering
Common to all Branches

Time: 3 Hours

Maximum Marks: 70

Instructions to Candidates:

Part – A: Short answer questions (up to 25 words) 10 × 2 marks = 20 marks. All **ten** questions are compulsory.

Part – B: Analytical/Problem solving questions 5 × 4 marks = 20 marks. Candidates have to answer **five** questions out of **seven**.

Part – C: Descriptive/Analytical/Problem Solving questions 3 × 10 marks = 30 marks. Candidates have to answer **three** questions out of **five**.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may 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)

1. **NIL** _____   2. **NIL** _____

PART – A

Q.1 Derive expressions for average value and RMS value of a sinusoidally varying AC voltage.   [2]

Q.2 What do you understand by the terms power factor, active power and reactive power?   [2]

Q.3 What are the advantages of three phase system?   [2]

https://www.btubikaner.com

Q.4 What are the information obtained from open circuit and short circuit test in a single phase transformer? [2]

Q.5 A 100 kVA rated transformer has a full-load copper loss of 1.8 kW and an iron loss of 1 kW. Determine the transformer efficiency at full load and 0.8 power factor. [2]

Q.6 A 4-pole d. c. motor and a wave-wound armature with 800 conductors. The useful flux per pole is 20 mWb. Calculate the torque developed when a current of 40 A flows in each armature conductor. [2]

Q.7 The armature resistance of 200 V dc shunt motor is 0.4 Ω and not load current is 2 Amp. When loaded, the armature current is 50 Amp. The speed is 1200 rpm. Find out the no-load speed. [2]

Q.8 Draw the block diagram of AM Transmitter. [2]

Q.9 Define latching and holding currents as applicable to an SCR. [2]

Q.10 Explain the application of junction diode as rectifier by drawing a suitable circuit. [2]

PART – B

Q.1 Explain briefly the series resonance in single phase AC circuit. [4]

Q.2 A three phase balanced system supplies 110 V to a delta connected load whose phase impedances are equal to (3.54 + j3.54)Ω. Determine the line currents and draw the phasor diagram. [4]

Q.3 A 230/110 V, 1-phase transformer takes an input of 350 VA at no load & at rated voltage. The core loss is 110 W. Find - [4]

(a) The iron loss component of no load current

(b) The magnetizing component of no load current

(c) No load power factor

Q.4 Draw and explain phasor diagram of an ideal transformer at no-load. [4]

Q.5 Explain electromagnetic spectrum in brief. [4]

Q.6 Draw output characteristics of CE configuration of BJT and explain different regions of its operation. [4]

Q.7 With the help of suitable block diagram, describe Amplitude modulation and demodulation techniques. [4]

PART – C

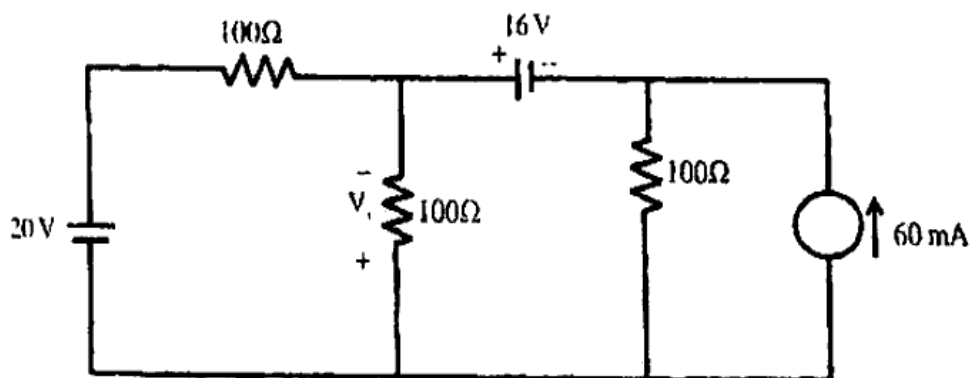Q.1 State and explain superposition theorem. Use this theorem to find the value of the voltage V_a shown in Fig. 1. https://www.btubikaner.com [10]

Figure – 1

Q.2 (a) Find the r.m.s value of the following current signal in a circuit.

$f(t) = 3 \sin \omega t + 4 \cos 2\omega t + 12 \sin 3\omega t + 5 \cos 3\omega t$ [5]

(b) A supply of 200 V, 50 Hz is connected with a 20Ω resistance in series with a choke coil (non - ideal). The reading of the voltmeter across the resistor is 100 V and across the coil is 140 V. Calculate power factor of the circuit. Also, determine the power consumed in the coil. [5]

Q.3 (a) Derive the expression of three phase power measured by two wattmeter method for a 3 phase balanced load. Draw the phasor diagram. [5]

(b) A 3 phase balanced Y connected load having resistance of 25Ω in each phase is connected to 400 V, 50 Hz, 3 phase supply. Find out - [5]

(i) Power consumed

(ii) Power consumed, if it is connected in Δ

(iii) If a resistance in one of the phases is open circuited/omitted, find out power consumed in each case.

Q.4 (a) The no-load current of a transformer is 15A at a power factor of 0.2 when connected to a 460 V, 50 Hz supply. The primary winding has 550 turns, calculate (i) the magnetizing component of no-load current, (ii) the iron loss, (iii) maximum value of flux in the core. [6]

(b) Explain the principle of operation of a DC motor with suitable diagram. [4]

Q.5 (a) Draw the basic block diagram of electronic communication system. State the function of transmitter. [5]

(b) Draw the block diagram of AM super heterodyne radio receiver and state the function of each block. [5]

11N502

B. Tech. I - Sem. (New Scheme) (Main) Exam., May - 2023
All Branch
1FY1 - 02 Engineering Physics
Common to all Branches

Time: 3 Hours

Maximum Marks: 70

Instructions to Candidates:

Part – A: Short answer questions (up to 25 words) 10 × 2 marks = 20 marks. All **ten** questions are compulsory.

Part – B: Analytical/Problem solving questions 5 × 4 marks = 20 marks. Candidates have to answer **five** questions out of **seven**.

Part – C: Descriptive/Analytical/Problem Solving/Design questions 3 × 10 marks = 30 marks. Candidates have to answer **three** questions out of **five**.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may 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)

1. __NIL_____   2. __NIL_____

PART – A

Q.1   State the essential difference between interference and diffraction of light.   [2]

Q.2   What is physical significance of wave function?   [2]

Q.3   The uncertainty principle imposes no restriction on the measurements related to macroscopic objects. Comment.   [2]

Q.4   Explain how X-ray diffraction can be used to characterize nano particles?   [2]

Q.5 Sketch a neat diagram of Fraunhofer diffraction at a single slit. [2]

Q.6 State the Maxwell's equations in their differential form. [2]

Q.7 Explain the terms - [2]

    (i) Basis

    (ii) Space lattice

    (iii) Unit cell

    (iv) Space group

Q.8 Write a short note on Davisson Germers experiment. [2]

Q.9 Write two examples of type-I and type-II superconductors. [2]

Q.10 What is meant by numerical aperture for an optical fibre? [2]

PART – B

Q.1 Explain how you can distinguish between linearly, circularly and elliptically polarized light. [4]

Q.2 Explain how Newton's rings experiment can be used to find the wavelength of the light source used. [4]

Q.3 What is de Broglie's hypothesis? Calculate the de-Broglie wavelength associated with electrons, which are accelerated by a voltage of 50 kV. [4]

Q.4 Explain top down and bottom up approach for the synthesis of nano materials. [4]

Q.5 Calculate the Zero-point energy for a particle in an infinite potential well for an electron confined to a 1 nm atom. [4]

Q.6 Explain the principle and working of a He-Ne laser by clearly drawing the energy level diagrams. [4]

Q.7 What is Hall effect and its importance in semiconductor industry? [4]

PART - C

Q.1 What are orthogonal wave functions? Write the Schrodinger equation for particle in a box and solve it to obtain energy Eigen values and Eigen functions. [10]

Q.2 (a) Explain what is population inversion and pumping in lasers? [4]

(b) With neat diagrams, describe the principle, construction and working of semiconductor laser. Also, discuss the application of lasers. [6]

Q.3 (a) What is diffraction grating? Describe how the wavelength of the monochromatic light is determined using it. [5]

(b) Find the number of orders visible if the wavelength of the incident radiation is 5000 Å and number of lines on the grating are 1000 in one centimeter. [5]

Q.4 (a) How would you produce polarized light by reflection? What is Brewster's Law? Calculate the angular position of the sun above the horizon so that light reflected from a calm lake is completely polarized. The refractive index of water is 1.33. [5]

(b) How would you ascertain the correct state of polarization (i.e. circularly, elliptically, plane, unpolarized, partial polarized etc.) of an unknown incoming beam of light with the help of a rotating Nicol prism and a quarter wave plate? [5]

Q.5 (a) Why semiconductors are doped? Giving suitable energy level diagram explain how doping by donors improve conductivity of a semiconductor. [7]

(b) Explain Meissner's effect. [3]

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B. Tech. I - Sem. (New Scheme) (Main) Exam., May - 2023
All Branch
1FY1 – 01 Engineering Mathematics – I
Common to all Branches

Time: 3 Hours   Maximum Marks: 70

Instructions to Candidates:

Part – A: Short answer questions (up to 25 words) 10 × 2 marks = 20 marks. All **ten** questions are compulsory.

Part – B: Analytical/Problem solving questions 5 × 4 marks = 20 marks. Candidates have to answer **five** questions out of **seven**.

Part – C: Descriptive/Analytical/Problem Solving/Design questions 3 × 10 marks = 30 marks. Candidates have to answer **three** questions out of **five**.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may 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)

1. NIL _____   2. NIL _____

PART – A

Q.1   What is the range of x for which the function -   [2]

y = x⁴ – 6x³ + 12x² + 5x + 7

$$y = x^4 - 6x^3 + 12x^2 + 5x + 7$$

is concave upwards?

Q.2   Find the radius of curvature at the origin for the curve $x^3 + y^3 - x^2 + y = 0$ [2]

Q.3 Find the asymptotes of $y^2 (x - b) = x^3 + a^3$. [2]

Q.4 Provide order and classification of the partial differential equation - [2]

$x (y^2 + z^2 q^2) = z p y^2$.

Q.5 If $y_1 = x^2$ is one of the independent solutions of the differential equation - [2]

$x^2 \dfrac{d^2y}{dx^2} - 2y = 0$

Then, find the second linearly independent solution.

Q.6 Solve the initial value problem - [2]

$(1 + y) dx + (x + 2y) dy = 0$, $y (0) = 1$

Q.7 Solve $\dfrac{dy}{dx} = \cos (x + y) + \sin(x + y)$. [2]

Q.8 Write a short note on the symmetry of Cartesian curves. [2]

Q.9 Solve $(D^4 + a^4) y = 0$, $a > 0$. [2]

Q.10 If $u = (x^2 + y^2 + z^2)^{-\frac{1}{2}}$, Show that [2]

$\dfrac{\partial^2 u}{\partial x^2} + \dfrac{\partial^2 u}{\partial y^2} + \dfrac{\partial^2 u}{\partial z^2} = 0$.

PART – B

Q.1 If $\theta = t^n \exp \left(\dfrac{-r^2}{4t}\right)$, find the value of n for which the relation [4]

$\dfrac{1}{r^2} \dfrac{\partial}{\partial r} \left(r^2 \dfrac{\partial \theta}{\partial r}\right) = \dfrac{\partial \theta}{\partial t}$

is true.

Q.2 Trace the polar curve $r = 3 + 2 \cos \theta$. [4]

Q.3 Find the equation of the cubic which has the same asymptotes as the curve [4]

$x^3 - 6x^2 y + 11 x y^2 - 6y^2 + x + y + 1 = 0$

and which touches the axis of y at origin and passes through the point (3, 2).

Q.4 If $u = \sin^{-1} \left(\dfrac{x+y}{\sqrt{x}+\sqrt{y}}\right)$, show that $\left(x \dfrac{\partial u}{\partial x} + y \dfrac{\partial u}{\partial y}\right) = \dfrac{1}{2} \tan u$. [4]

Q.5 Find the solution of the differential equation - [4]

$\dfrac{d^3y}{dx^3} - 9\dfrac{dy}{dx} = 10 \cos x$.

Q.6 Solve the differential equation - [4]

$$(x + a)^2 \frac{d^2y}{dx^2} - 4(x + a)\frac{dy}{dx} + 6y = x, a > 0.$$

Q.7 Reduce the partial differential equation - [4]

$$y + 2zq = q(4xp + yq)$$

To Clairaut's form and hence solve it.

PART – C

Q.1 Find the minimum value of the function $x + y + z$ subject to the condition [10]

$$\frac{a}{x} + \frac{b}{y} + \frac{c}{z} = 1.$$

Q.2 Solve the differential equation - [10]

$$\cos x \frac{d^2y}{dx^2} + \sin x \frac{dy}{dx} - 2y \cos^3 x = 2\cos^3 x.$$

Q.3 Show that the coordinates (α, β) of the center of curvature of the curve

$27ay^2 = 4x^3$ at (x, y) are given by $3a(\alpha + x) + 2x^2 = 0$ and $\beta = 4y + \frac{9ay}{x}$. [10]

Q.4 Solve by method of variation of parameters - [10]

$$\frac{d^2y}{dx^2} + (1 - \cot x)\frac{dy}{dx} - y \cot x = \sin^2 x.$$

Q.5 Write Charpit's equations. Find a general solution of $p^2 x + q^2 y = u$, $u = (x, y)$

using Charpit's equations. [10]

11N501

B. Tech. I - Sem. (New Scheme) (Main) Exam., May - 2023
All Branch
1FY1 – 01 Engineering Mathematics – I
Common to all Branches

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

Instructions to Candidates:

Part – A: Short answer questions (up to 25 words) 10 × 2 marks = 20 marks. All *ten* questions are compulsory.

Part – B: Analytical/Problem solving questions 5 × 4 marks = 20 marks. Candidates have to answer *five* questions out of *seven.*

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1. NIL _____   2. NIL _____

PART – A

Q.1   What is the range of x for which the function -   [2]

$$y = x^4 - 6x^3 + 12x^2 + 5x + 7$$

is concave upwards?

Q.2   Find the radius of curvature at the origin for the curve $x^3 + y^3 - x^2 + y = 0$ [2]

Q.3 Find the asymptotes of $y^2 (x - b) = x^3 + a^3$. [2]

Q.4 Provide order and classification of the partial differential equation - [2]

$x (y^2 + z^2 q^2) = z p y^2$.

Q.5 If $y_1 = x^2$ is one of the independent solutions of the differential equation - [2]

$$x^2 \frac{d^2y}{dx^2} - 2y = 0$$

Then, find the second linearly independent solution.

Q.6 Solve the initial value problem - [2]

$(1 + y) dx + (x + 2y) dy = 0, y (0) = 1$

Q.7 Solve $\frac{dy}{dx} = Cos (x + y) + sin(x + y)$. [2]

Q.8 Write a short note on the symmetry of Cartesian curves. [2]

Q.9 Solve $(D^4 + a^4) y = 0, a > 0$. [2]

Q.10 If $u = (x^2 + y^2 + z^2)^{-\frac{1}{2}}$, Show that [2]

$$\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} + \frac{\partial^2 u}{\partial z^2} = 0 .$$

PART – B

Q.1 If $\theta = t^n \exp \left(\frac{-r^2}{4t}\right)$, find the value of n for which the relation [4]

$$\frac{1}{r^2} \frac{\partial}{\partial r} \left(r^2 \frac{\partial \theta}{\partial r}\right) = \frac{\partial \theta}{\partial t}$$

is true.

Q.2 Trace the polar curve $r = 3+2 \cos \theta$. [4]

Q.3 Find the equation of the cubic which has the same asymptotes as the curve [4]

$x^3 - 6x^2y + 11 x y^2 - 6y^2 + x + y + 1 = 0$

and which touches the axis of y at origin and passes through the point (3, 2).

Q.4 If $u = \sin^{-1} \left(\frac{x+y}{\sqrt{x}+\sqrt{y}}\right)$, show that $\left(x\frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y}\right) = \frac{1}{2} \tan u$. [4]

Q.5 Find the solution of the differential equation - [4]

$$\frac{d^3y}{dx^3} - 9\frac{dy}{dx} = 10 \cos x .$$

Q.6 Solve the differential equation - [4]

$$(x + a)^2 \frac{d^2y}{dx^2} - 4(x + a)\frac{dy}{dx} + 6y = x, a > 0.$$

Q.7 Reduce the partial differential equation - [4]

$$y + 2zq = q(4xp + yq)$$

To Clairaut's form and hence solve it.

PART – C

Q.1 Find the minimum value of the function $x + y + z$ subject to the condition [10]

$$\frac{a}{x} + \frac{b}{y} + \frac{c}{z} = 1.$$

Q.2 Solve the differential equation - [10]

$$\cos x \frac{d^2y}{dx^2} + \sin x \frac{dy}{dx} - 2y \cos^3 x = 2\cos^3 x.$$

Q.3 Show that the coordinates (α, β) of the center of curvature of the curve

$27ay^2 = 4x^3$ at (x, y) are given by $3a(\alpha + x) + 2x^2 = 0$ and $\beta = 4y + \frac{9ay}{x}$. [10]

Q.4 Solve by method of variation of parameters - [10]

$$\frac{d^2y}{dx^2} + (1 - \cot x)\frac{dy}{dx} - y\cot x = \sin^2 x.$$

Q.5 Write Charpit's equations. Find a general solution of $p^2 x + q^2 y = u$, $u = (x, y)$

using Charpit's equations. [10]

11N505

11N505

B.TECH. I SEM (NEW SCHEME) MAIN/BACK SESSION 2023-24

MANAGERIAL ECONOMICS AND FINANCIAL ACCOUNTING

1FY3–05 - All Branch

Time : 3 Hours]   [Max. Marks : 70

Instructions to Candidates:

Part–A : Short Answer Type Questions (up to **25** words) 10 × 2 marks = 20 marks. All 10 questions are compulsory.

Part–B : Analytical/Problem Solving questions 5 × 4 marks = 20 marks. Candidates have to answer 5 questions out of 7.

Part–C : Descriptive/Analytical/Problem Solving/Design questions 3 × 10 marks = 30 marks. Candidates have to answer 3 questions out of 5.

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

Use of the following supporting materials is permitted during examination. (Mentioned in form no. 205). Simple Calculator

1_____   2_____

Part–A   2×10=20

Note :- Attempt all questions.

1. Scope of managerial economics

2. Limitation of Managerial Economics

3. Define Demand

4. Types of Elasticity

5. Concept of production function

6. Cost volume profit analysis

7. Perfect competition

8. Define Oligopoly.

9. Discuss double entry system.

10. Elaborate gross profit ratio.

Part–B

$4 \times 5 = 20$

Note :- Attempt any *five* questions.

1. Discuss the importance of managerial economics in present Scenario.

2. Describe concept of inflation in detail.

3. Explain demand curve with suitable example.

4. Discuss explicit and implicit costs in detail.

5. Discuss limitation of Break-even point.

6. Discuss phase of a business cycle.

7. The individual profit and loss statements of H Ltd. and S Ltd. are given below :

	H Ltd.	S Ltd.
Profit before tax	2,00,000	1,00.000
Investment income		
(Dividend receivable from S Ltd.)	8,000	
	2,08,000	1,00.000
Corporation tax	– 80,000	– 40,000
	1,28, 000	60,000
Less : Dividends proposed	15,000	10,000
	1,13,000	50,000

H Ltd. owns 80% of S Ltd. ordinary shares. Prepare a consolidated profit and loss account.

L-25

(2)

Note :-   Attempt any *three* questions.

1.   Show accounting equation on the basis of the following transactions :

    (a)   Ganguly commenced business with   ₹ 1,00,000

    (b)   Purchased machinery for   ₹ 30,000

    (c)   Purchased goods for   ₹ 40,000

    (d)   Sold all goods for cash   ₹ 60,000

2.   Consider the following statements :

    (i)   Double entry book-keeping mean that two sets of records are maintained.

    (ii)   In double entry book-keeping we have a basic check on the accuracy of the entries as the total value of the debit are the statements true or false ?

	Statement (i)	Statement (ii)
(a)	True	True
(b)	True	False
(c)	False	True
(d)	False	False

3.   Explain the following :

    (a)   Economic problem

    (b)   Law of supply

    (c)   Economies of scale

    (d)   Oligopoly

    (e)   Partnership

4.   Elucidate the pros and cons. of perfect competition in detail.

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11N501

11N501

B.TECH. I SEM (NEW SCHEME) MAIN/BACK
ACADEMIC SESSION 2023-24
ENGINEERING MATHEMATICS–I
1FY1–01 - Common to All

Time : 3 Hours]   **[Max. Marks : 70**

Instructions to Candidates:

Part–A : Short Answer Questions (up to **25** words) 10 × 2 marks = 20 marks. All 10 questions are compulsory.

Part–B : Analytical/Problem Solving questions 5 × 4 marks = 20 marks. Candidates have to answer 5 questions out of 7.

Part–C : Descriptive/Analytical/Problem Solving/Design questions 3 × 10 marks = 30 marks. Candidates have to answer 3 questions out of 5.

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

Use of the following supporting materials is permitted during examination. (Mentioned in form no. 205).

1____NIL____   2____NIL____

Part–A   2×10=20

1. Define asymptotes of the curve.

2. Define homogeneous function.

3. Define point of inflexion.

4. Define order and degree of a differential equation.

5. Define complete integral of the partial differential equation.

6. Solve :

$$(3D^2 - 4D - 4)y = 0$$

7. The one part of integral of the complimentary function in :

$$\left((1 - x^2)D^2 + xD - 1\right)y = 0, \quad D = \frac{d}{dx}$$

8. Define the tangent at the origin for tracing the Cartesian curve.

9. Define maxima and minima of two variables.

10. Define linear differential equation.

Part–B

4×5=20

1. Show that the asymptotes of the following curve cut in three points which lie on the straight line :

$$x - y + 1 = 0$$

$$x^3 - 2y^3 + 2x^2y - xy^2 + xy - y^2 + 1 = 0$$

2. Find the points where the function :

$$x^3 + y^3 - 3axy$$

has maximum or minimum value.

3. Solve :

$$(1 + y^2)dx = (\tan^{-1} y - x)dy$$

4. Solve :

$$(x^2D^2 - xD + 1)y = 2 \log x; \quad D = \frac{d}{dx}$$

5. Solve :

$$(mz - ny)p + (nx - lz)q = ly - mx$$

where $p = \dfrac{\partial z}{\partial x}$ and $q = \dfrac{\partial z}{\partial y}$.

L-21

(2)

6. If $u = e^{xyz}$, then prove :

$$\frac{\partial^3 u}{\partial x \partial y \partial z} = (1 + 3xyz + x^2 y^2 z^2)e^{xyz}$$

7. Find the radius of curvature of the curve $a(y^2 - x^2) = x^3$ at the origin.

Part–C
$3 \times 10 = 30$

1. Trace the curve :

$$y^2(a^2 + x^2) = x^2(a^2 - x^2)$$

2. Solve by the method of variation of parameters :

$$(1 - x)\frac{d^2 y}{dx^2} + x\frac{dy}{dx} - y = (1 - x)^2$$

3. Apply the Charpit's method to find the complete integral :

$$p^2 + q^2 - 2px \_ 2qy + 2xy = 0$$

4. Solve :

$$\frac{d^2 y}{dx^2} + (3\sin x - \cot x)\frac{dy}{dx} + 2\sin^2 x \cdot y = e^{-\cos x} \cdot \sin^2 x$$

5. Solve :

$$(D^2 - 4D + 4)y = 8x^2 \cdot e^{2x} \cdot \sin 2x$$

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11N503

B.TECH. I SEM (NEW SCHEME) MAIN/BACK EXAMINATION 2023-24

ENGINEERING CHEMISTRY

1FY1–03 - Common to All

Time : 3 Hours] **[Max. Marks : 70**

Instructions to Candidates:

Part–A : Short Answer Type Questions (up to **25** words) 10 × 2 marks = 20 marks. All 10 questions are compulsory.

Part–B : Analytical/Problem Solving questions 5 × 4 marks = 20 marks. Candidates have to answer 5 questions out of 7.

Part–C : Descriptive/Analytical/Problem Solving/Design questions 3 × 10 marks = 30 marks. Candidates have to answer 3 questions out of 5.

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

Use of the following supporting materials is permitted during examination. (Mentioned in form no. 205).

1 _____   , 2 _____

Part–A

2×10=20

1. What is a difference between the carbonate and non-carbonate hardness.

2. Give one method to prevent caustic embrittlement is boiler.

3. What is meant by alkalinity ? What are the ions which causes alkalinity to the water sample ?

4. Define gross and net-calorific value of fuel.

5. Give the percentage of carbon present in different varieties of coal.

6. What is meant by blending and doping in the gasoline ?

7. What is waterline corrosion ?

8. Name the various green solvents, which can be used in the chemical reactions ?

9. What are the microscopic constituents of portland cement ?

10. What is white cement ? Give its chemical compositions.

<div align="center">

Part-B $4 \times 5 = 20$

</div>

1. What is meant by knocking in a diseal engine ? How it can be controlled ?

2. With the help of chemical reactions, explain the demineralization of hard water and regeneration of ion-exchange resin. https://www.btubikaner.com

3. What is break point chlorination ? Give the significance of it.

4. What is Cracking ? Describe the working of fluid bed catalytic cracking process.

5. What are the different ways of formation of electrochemical corrosion ? Explain.

6. How the microwave and ultrasonication techniques are energy efficience process explain ?

7. What is Viscosity and viscosity index of lubricating oil ? Discuss their significance.

<div align="center">

Part-C $3 \times 10 = 30$

</div>

1. (a) A water sample contains following impurities :

$Mg(HCO_3)_2$ = 36.5 ppm, $CaCl_2$ = 55.5 ppm, $MgSO_4$ = 90 ppm, $MgCl_2$ = 142.5 ppm and NaCl = 90 ppm. Calculate :

    (i) Carbonate and non-carbonate hardness

    (ii) Amount of lime and soda required to soften 3,00,000 liters of water using $FeSO_4.7H_2O$ as a coagulent at the rate of 69.5 ppm.

(b) What is carbonate conditioning ? Why the carbonate conditioning is not used in high pressure boiler ?

L-23 (2)

2. (a) What is proximate analysis of a coal ? How it is performed ? Give the significance of it in coal utilization, in a certain application.

   (b) What is Junker's calorimeter ? How it is used, for analysis of calorafic value of gaseous fuel ?

3. (a) Name the various corrosion control process. What does mean by cathodic protection ? Explain the different cathodic protection techniques.

   (b) How the use of renewable resource for manufacturing of products is a sustainable process ? Explain with examples.

4. (a) Write various chemical reactions taking place in the rotatory kiln.

   (b) What is setting and hardening of cement ? Discuss the various chemical reactions involved in it.

5. (a) Write an informative note on a 'Reverse Osmosis'.

   (b) A fuel oil contains 85% C and 15% H. Calculate the weight of air to be supplied for one kg of fuel oil, if the air supplied used to be 18% in excess.

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11N508

B.TECH. I SEM (NEW SCHEME) MAIN/BACK EXAMINATION 2023-24

COMPUTER FUNDAMENTALS & PROGRAMMING

1FY2–08 - Common to All Branch

Time : 3 Hours]   **[Max. Marks : 70**

Instructions to Candidates:

Part–A : Short Answer Type Questions (up to **25** words) 10 × 2 marks = 20 marks. All 10 questions are compulsory.

Part–B : Analytical/Problem Solving questions 5 × 4 = 20 marks. Candidates have to answer 5 questions out of 7.

Part–C : Descriptive/Analytical/Problem Solving/Design questions 3 × 10 marks = 30 marks. Candidates have to answer 3 questions out of 5.

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

Use of the following supporting materials is permitted during examination. (Mentioned in form no. 205).

1_____   2_____

Part–A   2×10=20

1. Draw a flowchart to print the odd integers from 1 to 200.

2. Convert binary number 110101011000 to hexadecimal number.

3. The following code should print the values 1 to 10. Find the error in of the following code segments and explain how to correct it.

   n = 1

```
while (n < 10) {

printf ("%d ", n ++)"

}
```

4. Define data types in C with suitable example.

5. Define conditional operator with suitable example.

6. Write the output of the following code :

```
#include <stdio.h>

int main (void)

{

        int c;

        c = 100

        printf("%d\n", c)

        printf("%d\n", c ++)

        printf("%d\n\n", c)

}
```

7. Explain sizeof operator with suitable example.

8. What you mean by multidimensional array ? Write down the syntax to define multidimensional array.

9. Explain function in C with suitable example.

10. Write a statement that opens the file "oldmast.dat" for reading mode and assigns the returned file pointer to of Ptr.

<div align="center">Part–B</div> <div align="right">4×5=20</div>

1. Convert the following :

    (a) $(4FEC)_{16} = (?)_8$

    (b) $(317)_8 = (?)_{10}$

(c) $(EFD_4)_{16} = (?)_{10}$

(d) find 1's compliment of $(100111101)_2 = (?)_2$

2. Write a C program to display the following patterns :

1 2 3 4

2 3 4

3 4

4

3. Explain the concept of simple for loop and nested for loop. Write a C program using for loop to print the "Power of 2" table for the power 0 to 5.

4. Explain the concept of Structure and Unions in C with suitable example.

5. Explain category of function with suitable example.

6. Fill in the blanks in each of the following :

(a) Function .... closes a file.

(b) The .... function reads data from a file in a manner similar to how scanf reads from stdin.

(c) Function .... reads a character from a specified file.

(d) Function .... reads a line from a specified file.

(e) Function .... opens a file.

7. Explain the concept of else if ladder with suitable example.

<div align="center">Part–C   3×10=30</div>

1. What you mean by operator precedency and associativity ? Explain mixed-mode arithmetic with suitable example.

2. Define one-dimensional array. Write a C program that uses a one-dimensional array x to read values and compute the sum of their squares as defined in the following expression :

$$Total = \sum_{i=1}^{10} x_i^2$$

3. What is recursion ? Write a C program to find the sum of N natural numbers using recursion.

4. Explain the concept of files in C programming. Write a program to read data from the keyboard, write it to a file called INPUT, again read the same data from the INPUT file, and display the output.

5. Explain the concept of High-level, Assembly and Low-level languages. Write the difference between primary memory and secondary memory.

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