L-1/T-2/EEE **Date: 29/10/2023**

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-1/T-2 B. Sc. Engineering Examinations 2021-2022

Sub: **EEE 105** (Electrical Circuits II)

Full Marks: 210 Time: 3 Hours

The figures in the margin indicate full marks

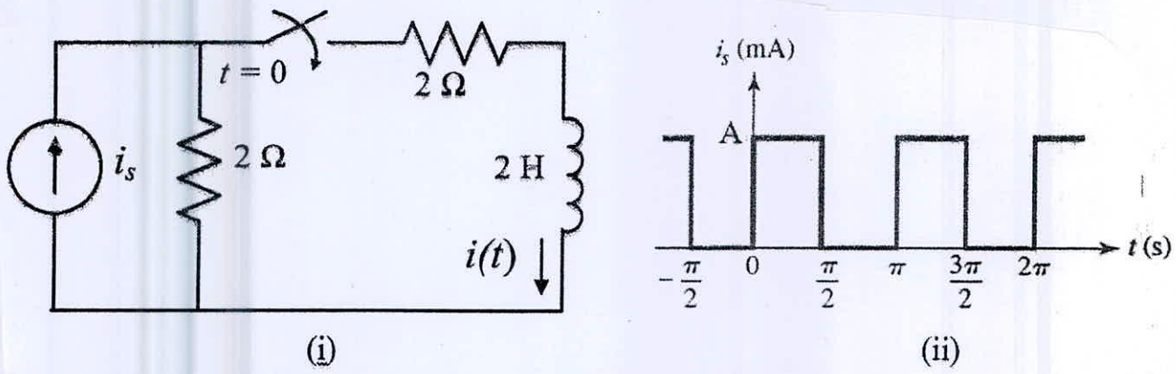
USE SEPARATE SCRIPTS FOR EACH SECTION

SECTION – A

There are FOUR questions in this section. Answer to Question No. 1 is compulsory. Answer any TWO questions from Question 2-4. The corresponding Course Outcomes (COs) of each part of Question 1 are mentioned on the right most column below the marks. The COs of the Course are mentioned at the end of the question paper.

1. (a) In the circuit of Figure 1(a(i)), determine the periodic response $i(t)$ corresponding to the forcing function shown in Figure 1(a(ii)) if $i(0) = 0$. The Fourier series for the waveform of Figure for Q. 1 a(ii) is given below. Given that, **18 (CO4)**

$$i_S(t) = 2.5 + \frac{10}{\pi} \sum_{n=1\,(odd)}^{\infty} \frac{Sin\,2nt}{n}$$



(i) (ii)

Fig 1(a)

(b) Sketch the Bode magnitude and phase plots for the following transfer function. **17 (CO5)**

$$G_v(j\omega) = \frac{25(j\omega + 1)}{(j\omega)^2(0.1j\omega + 1)}$$

2. (a) For the circuit shown in Figure 2(a), find the total energy stored in the coupled coils at t = 2 ms. Take ω = 1,000 rad/s. **(18)**

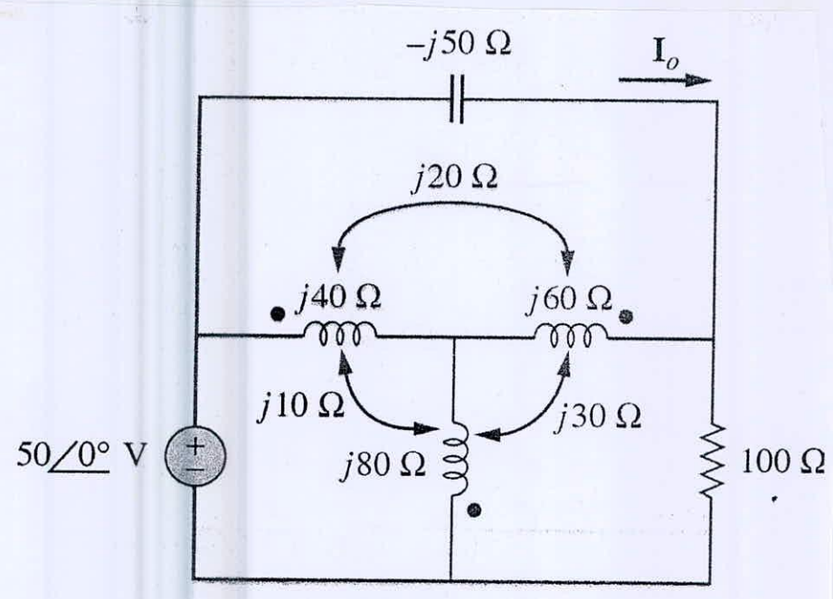


Fig 2(a)

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Contd.... for Q. No. 2

(b) Design a series RLC resonant circuit with $\omega_0 = 40$ rad/s and B = 10 rad/s. **(9)**

(c) A transformer is used to match an amplifier with a load as shown in the circuit of Figure 2(c). The Thevenin equivalent of the amplifier is $V_{TH} = 10\angle 0$ V and $R_{TH} = 8\ \Omega$. Find the required turns ratio for maximum energy power transfer to the load. **(8)**

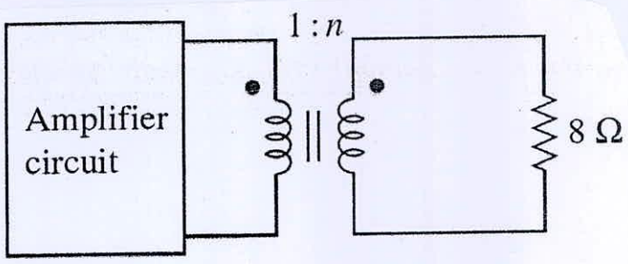

Fig 2(c)

3. (a) The switch in the circuit shown in Figure 3(a) has been open for a long time. The switch is closed at $t = 0$. Find the expression for $i(t)$ and $v(t)$ for $t>0$ when $I_S = 100\cos 10t$ mA. All resistances are in ohms. **(18)**

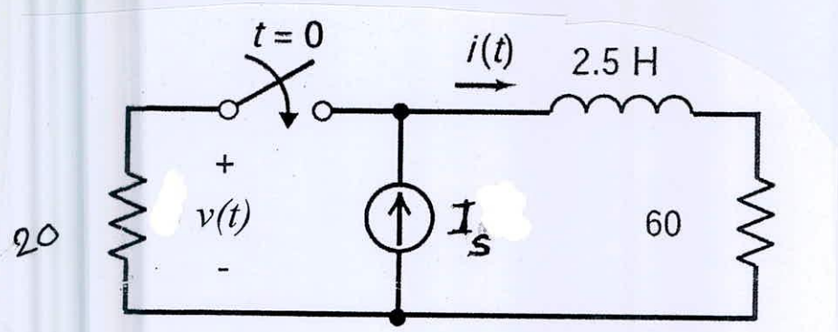

Fig 3(a)

(b) Calculate the average power supplied by the source and the input power factor for the circuit in Figure 3(b). If the supply voltage is **(9+8=17)**

$$v(t) = 60 + 36\cos(377t + 45^\circ) + 24\cos(754t - 60^\circ)\text{V}$$

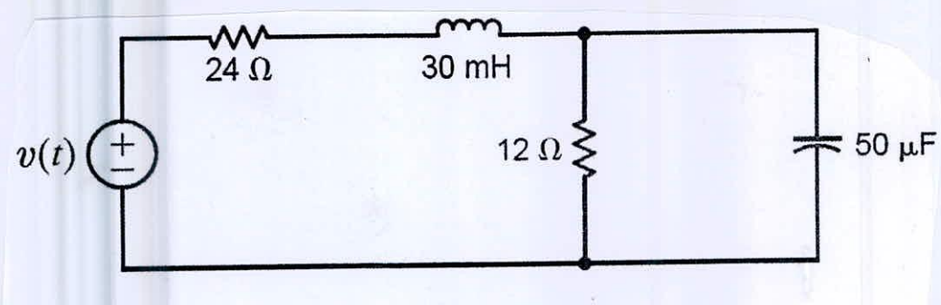

Fig 3(b)

4. (a) Consider the circuit in Figure 4(a), $R_1 = R_2 = 1\ \Omega$. Select C and L to obtain a resonant frequency ω_0 of 100 rad/s. **(16)**

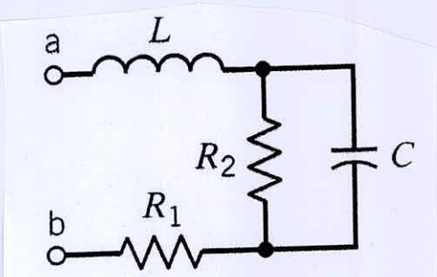

Fig 4(a)

(b) Given the circuit shown in Figure 4(b), determine the value of the capacitor C that will cause the impedance seen by the voltage source $24\angle 0°$ V to be purely resistive at f = 50 Hz. **(19)**

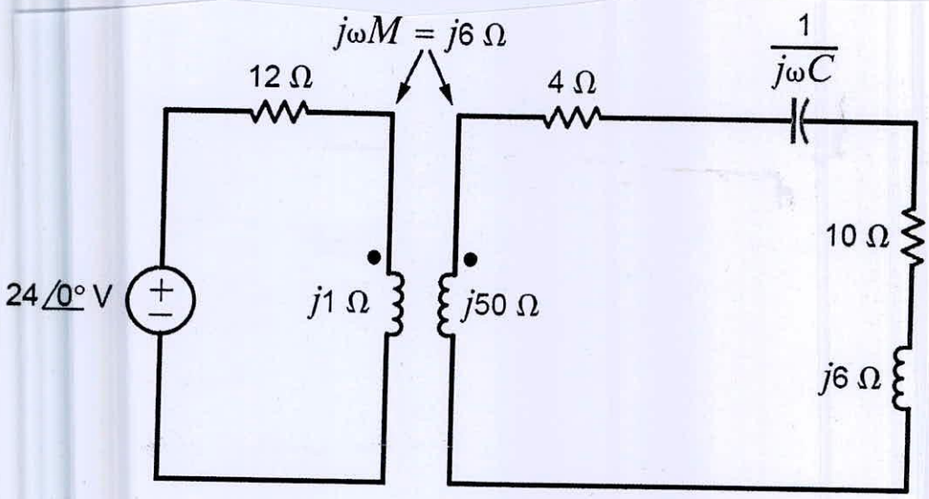

Fig 4(b)

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SECTION – B

There are FOUR questions in this section. Answer to Question No. 5 is compulsory. Answer any TWO questions from Question 6-8. The corresponding Course Outcomes (COs) of each part of Question 5 are mentioned on the right most column below the marks. The COs of the Course are mentioned at the end of the question paper.

5. (a) For a balanced 3-phase system, derive the relationship between line voltage, phase voltage and line current, phase current for both Δ and Y connections. **9 (CO1)**

(b) A balanced 3-phase source supplies power to three loads. The loads are **20 (CO3)**

Load-1: 30 kVA at 0.8 p.f. lagging

Load-2: 24 kW at 0.6 p.f. leading

Load-: unknown

The line voltage at the loads is 208 V (rms) and the line current at the source is 166.8 A (rms). The combined power factor at the load is unity. Analyze the 3-phase system to find the unknown load.

(c) A 3-phase industrial load consumes 88 kN at a p.f. of 0.707 lagging from a 480 V (rms) line of a power company. The resistance of the transformation line is 0.08 Ω. Employing circuit laws, determine the power that must be supplied by the power company if the p.f. is somehow changed to 0.90 lagging. **6 (CO2)**

6. (a) A 3-phase positive sequence Y-connected source supplies 14 kVA with a power factor of 0.75 lagging to a parallel combination of a Y-connected load and a Δ-connected load. The Y-connected load and uses 9 kVA at a power factor of 0.6 lagging and has an a-phase current of $10\angle -30°$ A. **(18)**

(i) Find the complex power per phase of the Δ-connected load.

(ii) Find the magnitude of the line voltage.

(b) Find the average power absorbed by a 100 Ω resistor if the current shown in Fig. for Q. 6(b) flows through the resistor. **(17)**

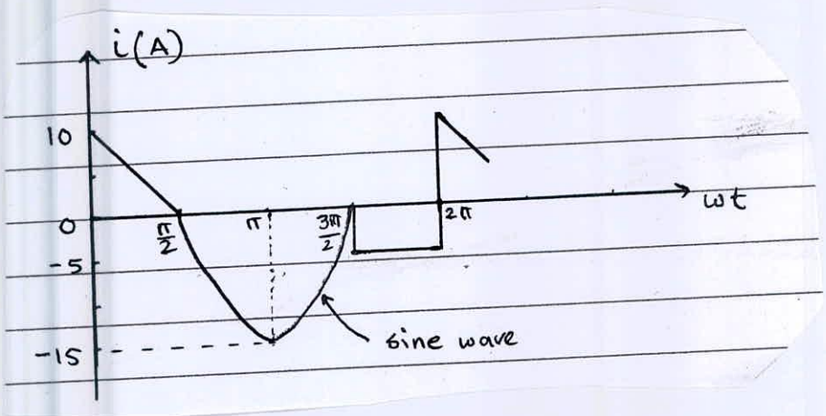

Fig. for Q. 6(b)

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7. (a) A 3-phase motor takes 10 kVA at 0.6 p.f. (lagging) from a source of 220 V line to line. It is in parallel with a balanced Δ-connected load having 32 Ω resistance and 12 Ω capacitive reactance in series in each phase. Find (i) line current. (ii) total volt-ampere, (iii) power factor of the combination and (iv) kVA rating of capacitor bank to be connected in parallel to improve the overall p.f. to 0.95 (lagging). Assume the motor to be Y-connected. **(20)**

(b) The total power consumed by both branches of the circuit shown in Fig. for Q. 7(b) is 2200 W. Calculate the values of I and power of each branch. **(15)**

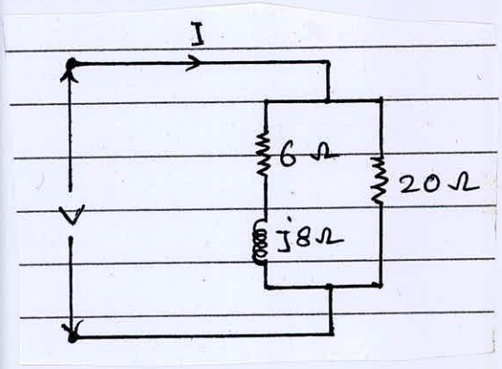

Fig. for Q. 7(b)

8. (a) Find the value of the load impedance Z_L that will absorb the maximum power for the circuit shown in Fig for Q. 8(a). Also calculate the value of the maximum power received by the load. **(18)**

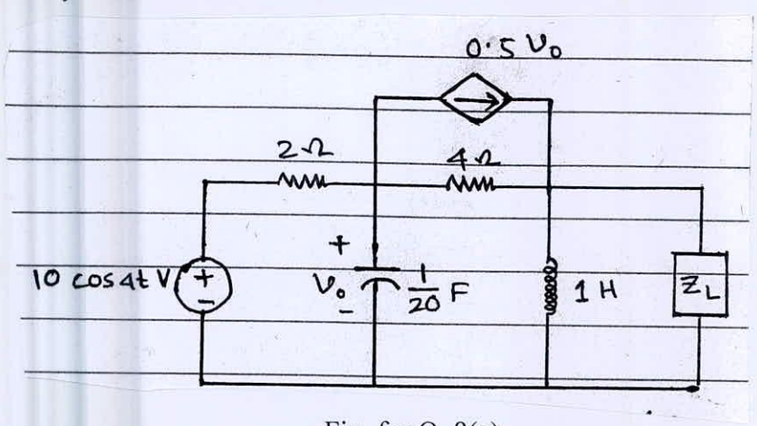

Fig. for Q. 8(a)

(b) Find the value of V_0 for the circuit shown in Fig. for Q. 8(b) using source transformation. **(17)**

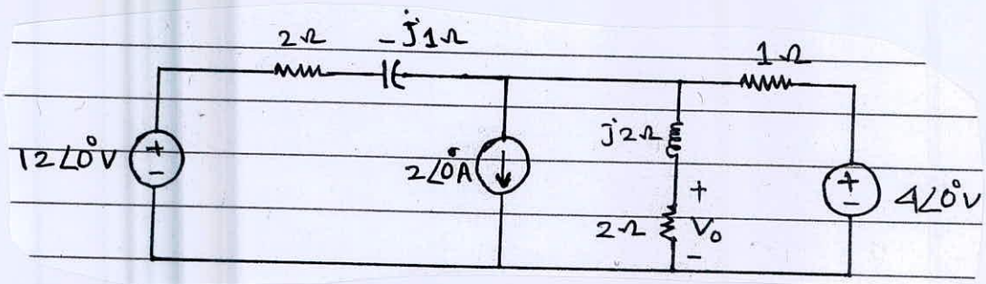

Fig. for Q. 8(b)

Course Outcomes of EEE 105

COs	CO Statement
CO1	Derive the expressions of voltage, current and power/energy of RL, RC and RLC circuits based on the concepts of phasors
CO2	Employ circuit laws, analysis methods, theorems to solve various AC circuits.
CO3	Analyse the 3-phase circuits with different combination of sources and loads that are used in power systems.
CO4	Apply differential equations to solve first and second order transient circuits,
CO5	Analyse the frequency response curve, nonsinusoidal waveforms

L-1/T-2/EEE **Date: 12/10/2023**

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-1/T-2 B. Sc. Engineering Examinations 2021-2022

Sub: **CHEM 101** (Chemistry)

Full Marks: 210 Time: 3 Hours

The figures in the margin indicate full marks

USE SEPARATE SCRIPTS FOR EACH SECTION

SECTION – A

There are **FOUR** questions in this section. Answer any **THREE**.

1. (a) What do you understand by radial nodes and angular nodes? Draw the orbital that contains the last electron in a chlorine atom and show the radial and angular nodes. **(15)**

   (b) From the concept of magnetism how can you prove Paul's exclusion principle? **(10)**

   (c) A spectral line in the Lyman series of hydrogen atom has a frequency of 82,200 cm^{-1}. Find the transition responsible for this radiation (R_H = 10973731 m^{-1}). **(10)**

2. (a) The last electron of potassium is placed at *4s* orbital rather than at *3d* – rationalize this based on Aufbau principle and effective nuclear charge. **(15)**

   (b) Arrange Mg, Al, Ga according to increasing IE_3 (3^{rd} ionization energy) values and justify your answer. **(10)**

   (c) Li and Mg atoms belong to different groups and periods, yet they show similarity in their properties — explain. **(10)**

3. (a) Compare the relative stability and magnetic properties of O_2, O_2^+ and O_2^- based on the molecular orbital theory. **(15)**

   (b) State VSEPR theory. Predict the shape of the molecules/ions and the hybridization of the central atoms by drawing the structures of H_3O^+ and ICl_4^- according to VSEPR theory. **(10)**

   (c) What do you understand by formal charge? Among all the possible Lewis structures for N_2O, identify the most preferable one and explain your answer. **(10)**

4. (a) Predict the pH (> 7, < 7, or ≈ 7) of aqueous solutions containing the following salts: (i) KBr, (ii) $Al(NO_3)_3$, (iii) $(CH_3COO)_2Ca$, (iv) NH_4Cl. **(15)**

   (b) Arrange the oxides in each of the following groups in order of increasing basicity and explain your answer: (i) K_2O, Al_2O_3, BaO, (ii) CrO_3, CrO, Cr_2O_3. **(10)**

   (c) 0.0560 g of acetic acid is dissolved in enough water to make 50.0 mL of solution. Calculate the concentrations of H^+, CH_3COO^-, and CH_3COOH at equilibrium. (K_a for acetic acid = 1.8×10^{-5}). **(10)**

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CHEM 101/EEE

SECTION – B

There are **FOUR** questions in this section. Answer any **THREE** questions.

5. (a) Classify gaseous, liquid and solid solutions with one example of each. Justify that the solubility of butanol is higher than pentanol in water? **(10)**

(b) Explain Henry's law in terms of solubility. Calculate the boiling point and freeing point of water containing 1 mol of NaCl. Given that K_b and K_f of water are 0.51 °C/m and 1.86 °C/m, respectively. **(10)**

(c) Deduce the phase rule. Describe the phase diagram of water. **(15)**

6. (a) Differentiate equivalent and molar conductance. Describe the change of molar conductance of strong electrolyte with the change of concentration. **(10)**

(b) Draw the schematic diagram of the cell given below: **(10)**

Pt (s) | H_2 (1 atm) | H^+(1M) || Cu^{2+}(1M) | Cu(s)

It E^0_{cell} is +0.34 V, how can you calculate the $E^0_{Cu^{2+}/Cu}$? Why salt bridge is necessary to construct the above cell?

(c) Explain with proper schematic diagram that corrosion is a redox process. Find some ways to prevent corrosion. **(15)**

7. (a) Clarify open, closed and isolated systems in thermodynamics with proper diagram. Show that change of enthalpy is equal to the heat at constant pressure. **(10)**

(b) State and explain Hess's law. If the standard enthalpy of formation of $CO_2(g)$, $CO(g)$ and $H_2O(g)$ are –393.5, –111.31 and –241.80 kJ mol^{-1}, respectively, calculate the standard enthalpy change for the reaction: $CO_2(g) + H_2(g) \rightarrow CO(g) + H_2O(g)$. **(10)**

(c) How can you explain equilibrium constant using law of mass action? Apply the Le Chatelier's principle to explain the effect of temperature, pressure and concentration on a reaction. **(15)**

8. (a) Differentiate between order and molecularity of reaction. Explain pseudo order reaction with a proper example. **(10)**

(b) Explain collision theory of reaction rates with proper diagram. How can you calculate activation energy using Arrhenius equation? **(10)**

(c) Derive the rate equation for first order reaction and show that half-life for a first order reaction is independent of the initial concentration. If 50% of a first order reaction is completed in 23 minutes, calculate the time required to complete 90% of the reaction. **(15)**

L-1/T-2/EEE **Date: 02/10/2023**

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-1/T-2 B. Sc. Engineering Examinations 2021-2022

Sub: **PHY 165** (Electricity & Magnetism, Modern Physics and Mechanics)

Full Marks: 210 Time: 3 Hours

The figures in the margin indicate full marks

USE SEPARATE SCRIPTS FOR EACH SECTION

SECTION – A

There are **FOUR** questions in this section. Answer any **THREE**.

1. (a) Distinguish between a conductor and an insulator. Briefly explain the term charge density. Assume Q amount of charge is induced in both conducting and insulating spheres of the same radius, R. Calculate charge density in each case. Mention their SI units. **(8)**

   (b) Consider a ring of radius, R, having charge Q. Calculate $\boldsymbol{E}$ for points on the axis of the ring a distance, x, from its center. **(12)**

   (c) A thin circular disk of radius, R, is charged uniformly so that the surface charge density is σ. Find the electric field on the axis of the disk at a distance, r, from the disk. **(15)**

2. (a) Briefly explain the term capacitance of a conductor. How is a capacitor formed? Mention some applications of capacitors. **(8)**

   (b) Distinguish between polar and non-polar dielectrics. What is the dielectric constant? Suppose a dielectric slab of dielectric constant κ is introduced in between the plates of a parallel plate capacitor. Show that the induced surface charge in the slab is less than that of the free charge of the capacitor plates. Hence, deduce Gauss's law in the case of dielectrics. **(15)**

   (c) A conducting sphere of radius, R, in a vacuum carries a charge, q. Compute the total electrostatic energy stored in the surrounding space. What should be the radius of a spherical surface to store half of this energy? **(12)**

3. (a) Define magnetic flux. What is the SI unit of magnetic flux? Consider a circuit comprising a conducting bar moving along two parallel conducting rails with constant velocity, v, in the presence of uniform magnetic field, **B**, perpendicular to v. What emf will be induced in the bar? **(10)**

   (b) Derive expressions for the inductance of toroids having rectangular, and circular cross-sections. **(15)**

   (c) A long coaxial cable consists of two concentric cylinders with radii a and b. Its central conductor carries a steady current, I, and the outer conductor provides the return path. (i) Calculate the energy stored in the magnetic field for the length, L, of such a cable, (ii) What is the inductance of a length, L, of coaxial cable? **(10)**

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4. (a) Define binding energy and mass defect of a nucleus. **(4)**

(b) (i) Draw a graph of average binding energy versus mass defect and explain its different parts. (ii) Unknown radiation of energy 'E' struck a slab of paraffin and protons of recoil energy 'K' were knocked out from the slab due to the head-on Compton collision. Find the expression of 'E' in terms of 'K' and the rest mass m_o of the proton along with the speed of light c. **(15+10)**

(c) Find the kinetic energies of an electron and a neutron, both of which have a dc Broglie wavelength of 10^{-14} m. **(6)**

SECTION – B

There are **FOUR** questions in this section. Answer any **THREE** questions.

5. (a) "The speed of light is not invariant under Galilean transformation"— Justify your answer. **(5)**

(b) Discuss Michelson-Morley experiment and hence obtain the expression of fringe shift. What are the two conclusions obtained from the experimental results? **(23)**

(c) The earth and sun are 8.3 light-minutes apart. Ignore their relative motion for this problem and assume they live in a single inertial frame, the Earth-Sun frame. Events A and B occur at t = 0 on the earth and at 2 minutes on the sun, respectively. Find the time difference between the events according to an observer moving at u = 0.8c from Sun to Earth. **(7)**

6. (a) What is photoelectric effect? Discuss the dependence of photocurrent on the intensity and the frequency of light along with an experimental outfit. **(12)**

(b) Review briefly the failure of wave theory of light to explain the results of photoelectric effect and show how quantum theory of light gives satisfactory explanation of the effect. **(15)**

(c) X-rays with wavelength λ = 1.00 Å are scattered from a carbon block. The scattered radiation is viewed at 90° to the incident beam. (i) What is the Compton shift $\Delta\lambda$? (ii) What kinetic energy is imparted to the recoiling electron? **(8)**

7. (a) How does classical mechanics deal with macroscopic systems? Briefly explain the inadequacy of classical physics for which the concept of quantum mechanics has been introduced. **(10)**

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PHY 165/EEE

Contd.... for Q. No. 7

(b) (i) Consider a particle of velocity v, momentum p and energy E moving in a bound region of potential V in x-direction. Obtain the one-dimensional time-dependent Schrödinger equation for the particle. **(10)**

(ii) When operators are said to be linear operator and Hermitian operator? Show that the eigen value of a Hermitian operator is real. **(8)**

(c) Write down the equation for energy and wave-function in 3D for a particle in a cubical box. Consider that the size of the cubical box is L = 1A wide. Find out the energy and wave-functions for threefold degenerate energy levels for the quantum numbers $\{n_x = 2, n_y = 2 \text{ and } n_z = 1\}$ respectively. **(7)**

8. (a) Consider a moving particle confined in a rigid box of size L. With the quantum mechanical approach solve the time-independent Schrödinger equation and show that the quantized energy is given by **(15)**

$$E = \frac{n^2 h^2}{8mL^2}$$

Where the symbols have their usual meaning.

(b) Show that the particle in the box mentioned in question 8(a) cannot have zero energy and the momentum corresponding to the zero-point energy is equal to $p_1 = \frac{h}{2L}$. **(10)**

(c) Normalize the wave-function $\psi(x,0) = Ce^{-|x|/x_0}$, where C and x_0 are constants. Calculate the probability of finding the particle in the interval $-x_0 \le x \le x_0$. **(10)**

L-1/T-2/EEE **Date: 07/10/2023**

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-1/T-2 B. Sc. Engineering Examinations 2021-2022

Sub: **MATH 257** (Ordinary and Partial Differential Equations)

Full Marks: 210 Time: 3 Hours

The figures in the margin indicate full marks

Symbols used have their usual meaning.

USE SEPARATE SCRIPTS FOR EACH SECTION

SECTION – A

There are **FOUR** questions in this section. Answer any **THREE**.

1. (a) Find the differential equation of the family of parabolas with vertex on the x-axis, with axis parallel to the y-axis, and with distance from focus to vertex fixed as a. **(11)**

(b) Find the solution satisfying the given initial condition, **(12)**

$$xy^2dx + e^x dy = 0 \text{ ; when, } x \to \infty, y \to \frac{1}{2}.$$

(c) The linear differential equation of the first order is of the form $\frac{dy}{dx} + Py = Qy^n$; where P and Q are the function of x or constant. Find the solution of the differential equation for (i) $n \neq 0, n \neq 1, Q \neq 0$, (ii) $n = 0, Q \neq 0$, (iii) $n = 1, Q \neq 0$ and (iv) $Q = 0$. **(12)**

2. (a) Find the integrating factor of $(xy\sin xy + \cos xy)ydx + (xy\sin xy - \cos xy)xdy = 0$ and hence solve it. **(12)**

(b) Solve the equation $L\frac{di}{dt} + Ri = E_0 \sin wt$, where L, R and E_0 are constants and discuss the case when t increases infinitely. **(12)**

(c) Solve the following differential equation: **(11)**

$$y = p(x-b) + \frac{a}{p}.$$

3. Solve the following differential equations:

(a) $(D^2 - 1)y = \cos hx \cos x$. **(11)**

(b) $(D^3 - 3D^2 + 4)y = \sin x;\ y(0) = 1,\ y'(0) = -8,\ y''(0) = -4$. **(12)**

(c) $(x^3D^3 + 2x^2D^2 + 2)y = x + \frac{1}{x}$. **(12)**

4. (a) Solve $y\frac{d^2y}{dx^2} + \left(\frac{dy}{dx}\right)^2 = \frac{dy}{dx}$. **(11)**

(b) Apply the method of variation of parameter to solve $(D^2 + 1)y = \cos ec\, x$. **(12)**

(c) Use the method of factorization of operators to solve the equation, $(x+2)\frac{d^2y}{dx^2} - (2x+5)\frac{dy}{dx} + 2y = (x+1)e^x$. **(12)**

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MATH 257/EEE

SECTION – B

There are **FOUR** questions in this section. Answer any **THREE** questions.

5. (a) Identify the nature of singular point of the differential equation **(25)**

$$x^2\frac{d^2y}{dx^2}+5x\frac{dy}{dx}+(x+4)y=0.$$

Hence solve the equation in series about $x = 0$.

(b) Develop a partial differential equation from $U(x,t)=Ae^{-\alpha^2 t}\cos\alpha x$. Write down the name of the PDE. **(10)**

6. (a) Apply Lagrange's method to solve the partial differential equation **(11)**

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

(b) Find the complete and singular integrals of the differential equation $z^2(p^2z^2+q^2)=1$. **(12)**

(c) Using Charpit's method, solve $pxy+pq+qy=yz$. **(12)**

7. Find the solution of the following partial differential equations:

(a) $(D_x^2-D_xD_y-2D_y^2)z=12x^2+2xy+e^{3x+y}$. **(11)**

(b) $(D_x^2-D_y^2-3D_x+3D_y)z=xy+e^{x+2y}$. **(12)**

(c) $\left(x^2\frac{\partial^2 z}{\partial x^2}-2xy\frac{\partial^2 y}{\partial x\partial y}-3y^2\frac{\partial^2 z}{\partial y^2}+\frac{\partial y}{\partial x}-3\frac{\partial z}{\partial y}\right)=x^2y\sin(\log x^2)$. **(12)**

8. (a) Apply the method of separation of variables to solve the following equation: **(15)**

$4\frac{\partial u}{\partial x}+\frac{\partial u}{\partial y}=3u$, subject to the condition that $u(0,y)=3e^{-y}-5e^{-5y}$.

(b) A bar 10 cm long with insulated sides has its ends A and B maintained at temperature 50°C and 100°C, respectively until steady state condition prevails. The temperature at A is suddenly raised to 90°C and at the same time lowered to 60°C at B. Find the temperature distribution in the bar at time t using heat equation. **(20)**

L-1/T-2/EEE **Date: 18/10/2023**

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-1/T-2 B. Sc. Engineering Examinations 2021-2022

Sub: **HUM 277** (Fundamentals of Economics)

Full Marks: 210 Time: 3 Hours

The figures in the margin indicate full marks

Symbols indicate their usual meaning.

USE SEPARATE SCRIPTS FOR EACH SECTION

SECTION – A

There are **FOUR** questions in this section. Answer any **THREE**.

1. (a) What are the assumptions of a perfectly competitive market? Explain. **(10)**

   (b) Explain the short run equilibrium of a firm under perfect competition. Show excess profit, loss, zero profit and shut down point. **(20)**

   (c) From the following revenue and cost functions, calculate the profit maximizing level of output and maximum profit. **(5)**

$$R = 100\,Q - Q^2$$

$$C = \frac{1}{3}Q^3 - 7Q^2 + 111Q + 90$$

2. (a) When does a firm emerge as a monopolist? **(10)**

   (b) Explain the long run equilibrium of a firm under monopoly. Graphically show the condition when **(20)**

   (i) it is operating in a large market.
   (ii) operating with sub optimal plant and excess capacity.
   (iii) operating at optimal plant size.

   (c) What is the relation among marginal revenue (MR), price (P) and price elasticity of demand (e)? **(5)**

3. (a) From the following demand function, make a hypothetical demand schedule and plot the curve. **(10)**

$$Q = 80 - 20P + P^2.$$

   (b) What are the main causes of shifting of the demand curve? Explain. **(15)**

   (c) What are the exceptions to the law of demand? Explain. **(10)**

4. (a) A manufacturer has a fixed cost of $40,000 and a variable cost of $1.60 per unit made and sold. Selling price is $2 per unit. **(10)**

   (i) Find the revenue, cost and profit functions using q for the number of units.
   (ii) Compute profit if 150000 units are made and sold.
   (iii) Find the break-even quantity.
   (iv) Construct the break-even chart. Label the cost and revenue lines, the fixed cost line, and the break-even point.

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HUM 277/EEE

Contd.... for Q. No. 4

(b) Complete the following table and sketch the graph explaining the relations among the various short run cost curves. **(15)**

Quantity of output	Total fixed cost	Total variable cost	Total cost	Average fixed cost	Average variable cost	Average Total cost	Marginal cost
1	70	30					
2			110				
3		45					
4		55					
5		75					
6	70		190				

(c) Define fixed cost and variable cost. **(10)**

SECTION – B

There are **FOUR** questions in this section. Answer any **THREE** questions.

5. (a) Discuss the social costs of inflation. **(10)**
   (b) Discuss Fisher's 'Quantity Theory' of money and its implication. **(20)**
   (c) What do you mean by Fisher's effect? **(5)**

6. (a) Discuss Solow growth model and its limitations. **(15)**
   (b) Discuss the effect of increasing saving rate and depreciation rate on long run equilibrium level of per capita capital stock, per-capita consumption, and per-capita output. **(20)**

7. (a) How is national income determined as per the Keynesian school of thought. **(15)**
   (b)How does the Keynesian school of thought differ from the classical school of thought regarding the effect of increasing government expenditure on national income, private investment, and inflation? Explain. **(10)**
   (c) Which of the versions of school thoughts i.e., classical and Keynesian would be more applicable to analyze the increase in government expenditure of Bangladesh in recent years? Explain. **(10)**

8. (a) What do you understand by localization of industries? What are the causes of localization of industries? **(10)**
   (b) Explain the advantages and disadvantages of localization of industries. **(15)**
   (c) What do you understand by division of labour? Explain different types of division of labour. **(10)**
