Aliah University

Department of Electrical Engineering, B-Tech
Odd (Autumn) Semester Examination, 2024 (Reg./Supple)
Subject: Basic Electrical Engineering **[EENUGES01]**

Full Marks: 80 | Time: 3 Hours
Year: I | Semester: II

Instructions:
1. Mention the question number clearly and write all the parts of a question at one place.
2. Draw circuit/figure/phasor diagram wherever applicable (including numerical).
3. Make suitable assumptions wherever necessary, symbols and notations have their usual meanings.

1. i) Distinguish between a Loop and Mesh of a circuit. **2x10= 20 Marks**
ii) State the principle of operation of a single-phase transformer.
iii) What is series resonance?
iv) Give two basic speed control schemes of DC shunt motor.
v) State maximum power transfer theorem.
vi) Is Ohm's law true for all conductors? Name two types of commercially available resistors.
vii) An electric iron is rated 1000W, 240V. Find the current drawn and resistance of the heating element.
viii) Can DC supply be applied to transformers?
ix) What will happen if DC shunt motor is connected across AC supply?
x) What are the three types of power used in AC circuits?

Answer any five questions **5x12=60 Marks**

2. a) Write the steps involved in Norton's theorem and draw Thevenin's equivalent circuit across 20 Ω resistor for the shown in **Fig. 1** . **6**
b) Differentiate between mesh and nodal analysis of a circuit. Determine the voltage through 10 Ω resistor using superposition theorem as shown in **Fig. 2** . **6**

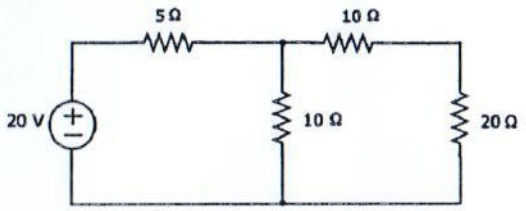


Fig. 1

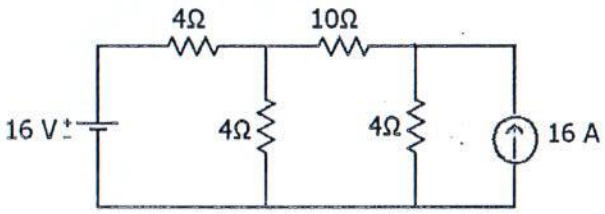


Fig. 2

3. a) In an R-C circuit with DC excitation (driven circuit) determine the expression for instantaneous capacitor voltage and instantaneous capacitor current and plot them with respect to time. **8**
b) In an RL circuit having time constant 400 ms the inductor current decays and its value at 500 ms is 0.8. Amp Find the equation of $i_L(t)$ for $t > 0^+$ **4**

4. a) Derive the emf equation for single phase transformer. **6**
b) A 50kVA, 5000/500V, 50 Hz, single phase transformer has the high and low voltage winding resistance of 8 ohm and 0.04 ohm, respectively. The no-load loss of the transformer is given as 900 W. Find the efficiency of the transformer at full load and 0.8 power factor lagging. **6**

5. a) Given $v = 200 (\text{Sin } 314t)$ Volts and $i = 200 \text{ Sin } (314t - 30°)$ Amps for an AC circuit, determine i) the power factor ii) True power iii) Apparent power iv) Reactive power. Indicate the unit of the power calculated. **8**

b) Write a short note on power triangle. **4**

6. a) With usual notations, develop the torque equation of a D.C. motor **6**

b) A separately-excited DC generator develops an induced emf of 220 V while running at 900 rpm with a flux of 0.05 Wb/pole. What would be required speed if the emf of 200 V is to be generated with a flux of 0.045 Wb? **6**

End-Semester Examination - 2024 (Autumn)
MATUGBS01
(Engineering Mathematics – I)
Semester – I (B. Tech in CEN, MEN, ECE, EEN, CSE/ BCA)

Full Marks – 80 **Time – 3 Hours**

Notations and symbols have their usual meaning.

Use separate answer sheets for Group – A and Group – B

Group–A (40 marks)

1. Answer all the following questions: $1 \times 5 = 5$

(a) Define convergent sequence in Real number.

(b) Write the definition of oscillatory series.

(c) Define local maxima and local minima of a function.

(d) Write the statement of L'Hospital theorem.

(e) State the relation between the Gamma and Beta function.

2. Answer all the following questions: $1 \times 5 = 5$

(a) The value of the $\lim_{x \to 1} \frac{1-x^2}{x^2+x-2}$ is

(1) -2 (3) 1

(2) $-\frac{2}{3}$ (4) 2

(b) The value of the $\beta(4,7) =$

(1) $\frac{2}{99}$ (3) $\frac{1}{33}$

(2) $\frac{1}{99}$ (4) $-\frac{4}{99}$

(c) Find the value of c guaranteed by the Rolle's theorem of $f(x) = 3x^3 - 4x$ in $[-1,0]$

(1) $\frac{2}{3}$ (3) $-\frac{2}{3}$

(2) $\frac{4}{9}$ (4) $-\frac{4}{9}$

(d) If a series $\sum x_n$ is convergent then which of the following always occurs

(1) $\lim_{n \to \infty} x_n = 1$ (3) $\lim_{n \to \infty} x_n = 0$

(2) $\lim_{n \to \infty} x_n = \infty$ (4) $\lim_{n \to \infty} x_n \neq 0$

(e) Which of the following is not correct

(1) $\lim_{n\to\infty} \frac{1}{n}$ is convergent

(2) $\lim_{n\to\infty} \frac{1}{n}$ is divergent

(3) $\lim_{n\to\infty} \frac{1}{n^2}$ is convergent

(4) $\lim_{n\to\infty} \frac{1}{\sqrt{n}}$ is divergent

3. Answer any **SIX** of the following questions: $5\times 6 = 30$

(a) Show that the below sequence is convergent 4+1

$\sqrt{3}, \sqrt{3+\sqrt{3}}, \sqrt{3+\sqrt{3+\sqrt{3}}}, \sqrt{3+\sqrt{3+\sqrt{3+\sqrt{3}}}}, \ldots$. Find out where it converges.

(b) Test the convergence of the following series by Cauchy's root test. 5

$$\sum_{n=1}^{\infty} \left(\frac{n}{n+1}\right)^{n^2}$$

(c) Test the convergence of the series 5

$$\frac{2}{1\cdot 3} + \frac{3}{3\cdot 5} + \frac{4}{5\cdot 7} + \cdots$$

(d) Find the value of x for which the function $f(x) = x^3 - 6x^2 + 9x + 7$ has maximum and minimum. Find the global maximum of and minimum values in $[0,6]$. 5

(e) (i) Show that $\lim_{x\to 0} \cos\left(\frac{1}{x}\right)$ does not exist. 4+1

(ii) Define the radius of convergence.

(f) Verify the Rolle's theorem of the following function 5
$f(x) = 2x^3 + x^2 - 4x - 2$, in the interval $-\sqrt{2} \le x \le \sqrt{2}$.

(g) Show that the function $f(x)$ is continuous at the points $6, 0$, and -2, where, 5
$f(x) = |x| - |x+2| + |x-6|$.

(h) Evaluate by L' Hospital rule, $\lim_{x\to 1} \left(\frac{x}{x-1} - \frac{1}{\log x}\right)$. 5

(i) If m is a positive integers, then 5

$$\beta(m,n) = \frac{(m-1)!}{n(n+1)(n+2)\cdots(n+m-1)}.$$

Group - B (40 marks)

1. Answer all the following questions: $1 \times 5 = 5$

(a) The line $\frac{x-1}{2} = \frac{y-1}{1} = \frac{z-0}{-1}$ is perpendicular to the line

(1) $\frac{x}{1} = \frac{y}{-1} = \frac{z}{1}$ (3) $\frac{x-1}{2} = \frac{y-1}{-3} = \frac{z-7}{1}$

(2) $\frac{x-2}{1} = \frac{y-5}{1} = \frac{z-0}{1}$ (4) $\frac{x-2}{0} = \frac{y-4}{1} = \frac{z-0}{-1}$

(b) The distance between two planes $12x-4y+3z+10=0$ and $12x-4y+3z+36=0$ is

(1) 1 (3) 3

(2) 2 (4) 4

(c) The angle between two planes $x+y+1=0$ and $y+z+1=0$ is

(1) 0 (3) $\frac{\pi}{3}$

(2) $\frac{\pi}{2}$ (4) $\frac{\pi}{4}$

(d) If $f(x,y,z) = 3x^2y - y^3z^2$, then grad f at $(1,-2,-1)$ is equal to

(1) $12i+9j+16k$ (3) $i+9j+16k$

(2) $-12i-9j-16k$ (4) $i+9j-16k$

(e) For which type of curve can we use Green's theorem?

(1) open curve (3) both for open and closed

(2) closed curve (4) all of above

2. Answer all the following questions: $1 \times 5 = 5$

(a) Convert the point $(7,-7\sqrt{3})$ in to the polar coordinate.

(b) Find out the direction cosine of the straight line $\frac{2x-1}{6} = \frac{2-y}{4} = \frac{2z-3}{24}$.

(c) What do you mean by the curvature of a curve?

(d) What do you mean by the arc length of a curve?

(e) Find out the value of the double integral $\int_0^1 \int_0^1 (x^2)\, dxdy$

3. Answer any **SIX** of the following questions: $5 \times 6 = 30$

(a) I) If a line makes an angle $\frac{\pi}{3}$ with x-axis, $\frac{\pi}{3}$ with y-axis and $\theta \in (0,\pi)$ with z-axis, then find out the value of θ. $2\frac{1}{2}$

II) Find out the nature of the quadratic surface $2x^2+5y^2+3z^2-4x+20y-6z=5$ and hence evaluate its volume. $2\frac{1}{2}$

(b) Find out the image of the point $(-3,8,4)$ with respect to the plane $6x-3y-2z+1=0$. 5

(c) Write down the equation of the line that is perpendicular to both lines given below; hence, find out the distance between the lines given below 5

$$\frac{x-1}{1} = \frac{y-1}{1} = \frac{z-0}{0} \text{ and } \frac{x-1}{0} = \frac{y-1}{1} = \frac{z-2}{1}$$

(d) Find out the equation of the plane passing through the point $(1,1,2)$ and perpendicular to the planes $x-y+z=1$ and $2x-3y+z=1$. 5

(e) Find out the curvature at any point t of the curve 5

$$F(t)=(\cos t,-\sin t,2t).$$

(f) Find out the torsion of the curve 5

$$F(t)=(e^t,e^{-t},\sqrt{2t}).$$

(g) Evaluate

$$\iint (x+y)\,dxdy$$

over the region enclosed by the circle of radius 2, $y=x$ and the positive x axis. 5

(h) Evaluate

$$\iiint (x+y+z+1)dxdydz$$

over the region defined by $x\geq 0,\ y\geq 0,\ z\geq 0,\ x+y+z\leq 1$. 5

(i) Use Green's theorem to evaluate

$$\oint_C (3xy^2-6y)dx+(y-3xy)dy$$

where C is the boundary of the region $x=0,\ y=0,\ 2x+3y=12$. 5

(j) Use Divergence theorem to evaluate

$$\iint_S \vec{F}\cdot d\vec{S}$$

where $\vec{F}=\cos(\pi x)\hat{i}+2xy^3\hat{j}+(z^2-4x)\hat{k}$ and S is the surface of the box with $-1\leq x\leq 2,\ 0\leq y\leq 1$ and $1\leq z\leq 4$. 5

UG" END SEMESTER EXAMINATION – JANUUARY,2025

(REGULAR-ODD SEMESTER)

1st" YEAR (1st SEMESTER) - MECHANICAL ENGINEERING

ENGINEERING MECHANICS

MENUGES01

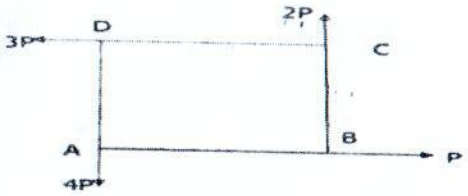
(Full Marks – 80) Time – 3 Hours

(Assume any missing data if any)

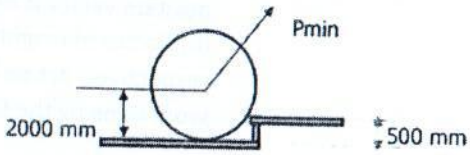
Group- A

(Answer any five questions) [5x (3+5) =40]

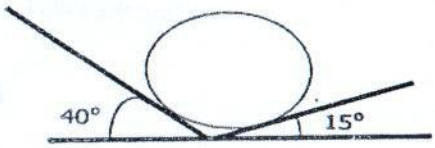
1. (a) What is transmissibility of force? Explain with example. Is it applicable to internal forces also?
   (b)Four forces equal to P, 2P, 3P & 4P are respectively acting along the four sides of a square ABCD taken in order (As Shown). Find the magnitude, direction and position of the resultant force if each side of square is 100mm.



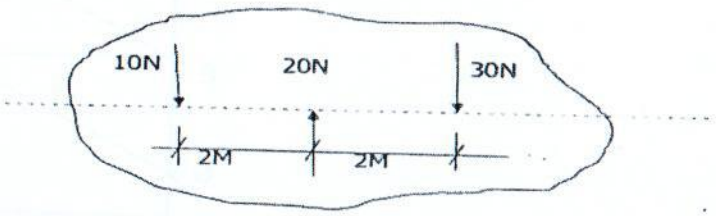
2. (a) State Lami's theorem.
   (b) A roller of radius 2000mm and weight 100N is to be pulled over a curb of height 500mm by a horizontal force 'P' applied to end of a string wound round the circumference of the roller as shown. What will be the minimum magnitude of force 'P' required to start the roller over the curb?



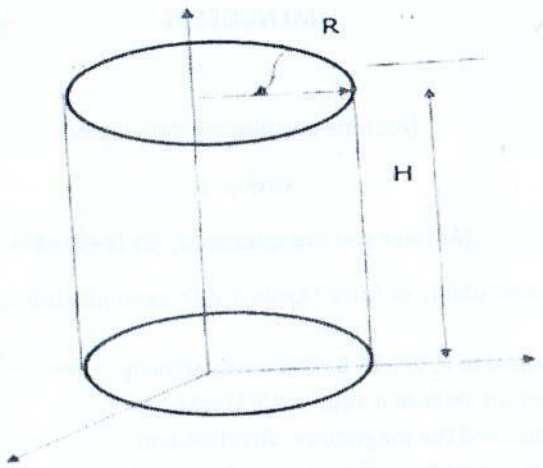
3. (a) What is force system & mention types of 2D force system with sketches.
   (b) A smooth circular cylinder of radius 1.5m is lying in a triangular groove. One side of which makes 15^0 angle and the other 40^0 angle with horizon. Find the reactions at the surface of contact, if there is no friction and the cylinder weight is 100N.



4. (a) What are moment of Force and moment of couple ? Explain force couple system with an example.
   (b) For given many forces on the body find
   (i) Resultant Force R
   (ii) Net Resultant moment at A, B, C
   (iii) Net- equivalent force couple system at A, B, C
   (iv) the position of resultant R with respect to A, B, C

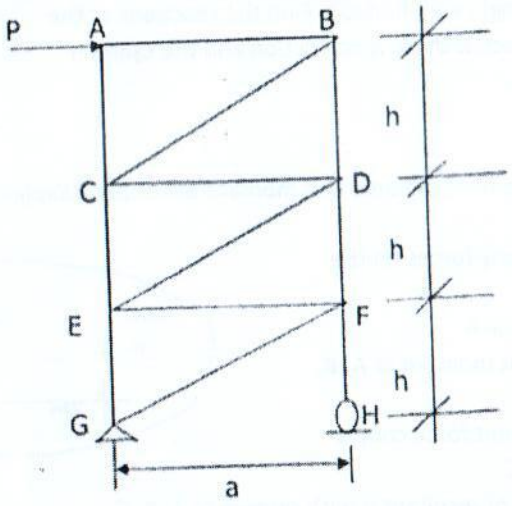


5. (a) State parallel axis theorem in moment of inertia.
(b) Determine the mass moment of Inertia of the Cylinder of radius, R & height, H.



6. (a) Force 2i +7j, -i +2j-k, 2i-5j+6k act at a point p (4i-3j-2k). Find the vector moment and the magnitude of moment of the resultant of these forces acting at 'P' about the point 'O' whose position vector is 6i+j-3K.
(b) Forces of magnitudes 5 units and 3 units acting in the direction 6i+2j+3k and 3i-2j+6k respectively act on a particle which is displaced from the point (2,2,-1) to (4,3,1). Find the work done by the forces.

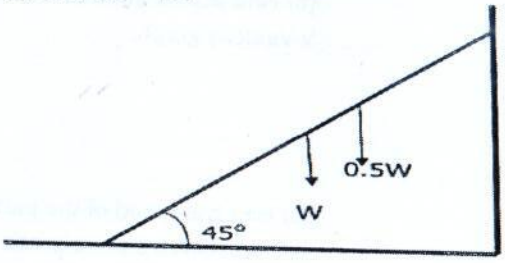
7. (a) Mention three major differences between truss and frame. What is imperfect and perfect truss?
(b) Find the axial forces in members CE, ED & DF by section method.



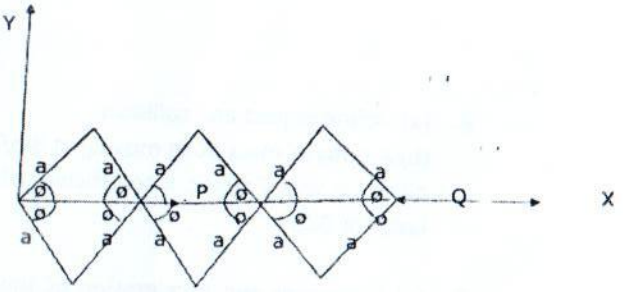
Group – B

(Answer any four questions only) [4x (10) =40]

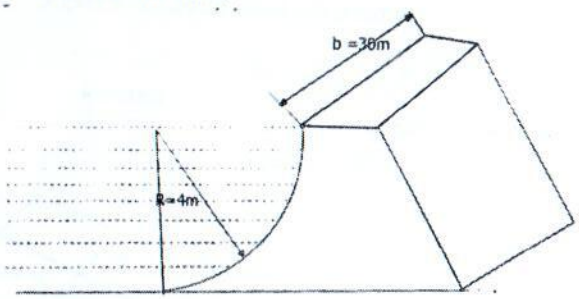
1. (a) Define friction. State three dry coulomb's Laws.
(b) A uniform Ladder of 4m length rests against a vertical wall with which it makes an angle of 45°. The co-efficient of between ladder and the wall is 0.4 and that between floor and the ladder is 0.5. Now, if man whose weight is one half of that of the ladder ascends it then how high will it be when the ladder is just starting to slip? Weight of ladder =W.



2. (a) State principle of virtual work.
(b) Find the relationship between P and Q for equilibrium of the system as shown in figure. All the members are assumed to be weightless. Apply virtual work principle to solve this problem. Each side of the structure having a length of 'a' and makes an angle ø with 'X' axis as shown in figure.

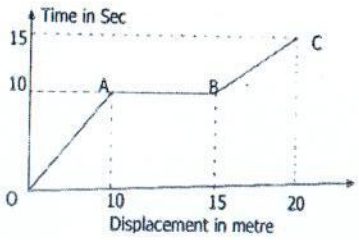


3. (a) What is static fluid? What will be the shear force of static fluid?
(b) Determine completely the resultant force 'R' exerted on the cylindrical dam surface by the water. The density of water is 1000 kg/m3 and the dam has a length of 'b=30m' normal to the paper.

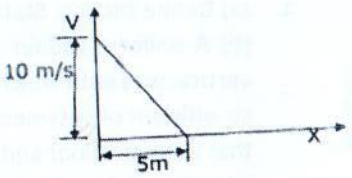


4. (a) A ball is thrown vertically upward from ground. Two men standing on different height of a building watch the ball passing by the at 20m/sec and 10 m/sec respectively. How high does the ball rise beyond second man and first man?
(b) A particle moving in a plane as ($x=2+3t^2$, $y= 3+t^3$), then find its position, velocity and acceleration at t=3 sec.

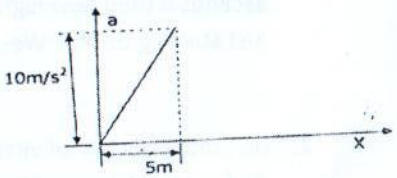
5. (a) Time displacement graph is given below. Find the velocity in OA, AB and BC region.



(b) Find acceleration at x=2m from given X (Displacement)-V Velocity graph.

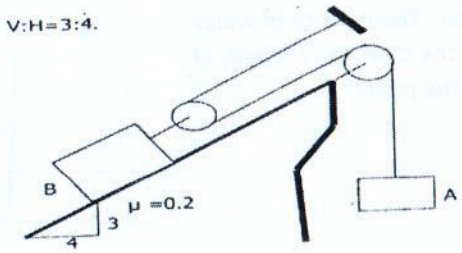


(c) Find the speed of the particle at X=5m if at X=0, speed is 2m/s. Given a (Acceleration) -X (Displacement) graph.

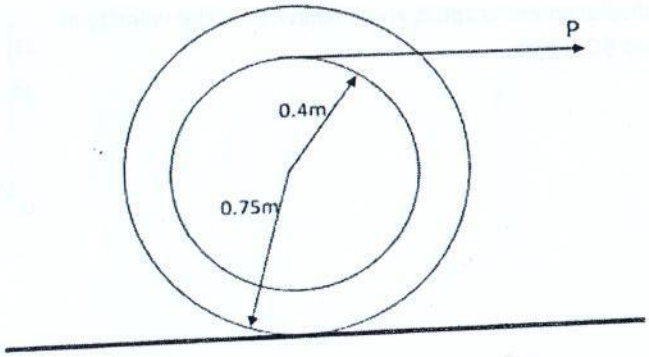


6. (a) Define impact and collision.
   (b) A body of mass 30Kg moving at 3m/s strike to another body of mass 15kg in just opposite direction with 7m/sec. If co-efficient of restitution, e=0.6, then find average impact force if it lasts for 0.2sec.

7. (a) Determine the acceleration of the body B and the tension in the string (Inextensible) supporting body A as shown. Pulleys are ideal pulley and Weights of body A and B are 500N and 750N respectively. Co-efficient of friction, μ =0.2. Inclination of plane with horizontal where the body B rests is V:H=3:4.



(b) The 100Kg wheel shown in fig. has a radius of gyration of 0.35m. A cable is wrapped around the central hub of the wheel and applying a horizontal force having variable magnitude of P=(10+t) N, where t is in seconds. If the wheel is initially at rest, determine its angular velocity in 5 secs. Assume that the spool rolls without slipping.



Autumn (Odd) Semester Examination -2024

Course Code: PHYUGBS01

Course Title: Engineering Physics

Department of Appearing Students: Engineering, SEM-I, 1st Year

Full Marks: 80 **Time:** 3.00 hrs

Answer any eight questions $10 \times 8 = 80$

1. (a) Define i) unit vector and ii) null vector.
(b) Find a unit vector parallel to the resultant of $\overrightarrow{r_1} = 2\hat{i} - 4\hat{j} + 5\hat{k}$ and $\overrightarrow{r_2} = \hat{i} + 2\hat{j} + 3\hat{k}$
(c) Determine the value of "a" such that $\vec{A} = 2\hat{i} + a\hat{j} + \hat{k}$ and $\vec{B} = 4\hat{i} - 2\hat{j} - 2\hat{k}$ are mutually perpendicular to each other.
(d) If $\vec{A} = 2\hat{i} - 3\hat{j} - \hat{k}$ and $\vec{B} = \hat{i} + 4\hat{j} - 2\hat{k}$ find $(\vec{A} + \vec{B}) \times (\vec{A} - \vec{B})$

(2+3+2+3)

2. (a) Define moment of inertia of an object. What is radius of gyration?
(b) State the law of conservation of angular momentum.
(c) Fund the relation between torque and moment of inertia.
(d) State parallel axes theorem of moment of inertia.
(e) Three masses 3 kg, 4 kg and 5 kg are located at the corners of a equilateral triangle of side 1m. Find the center of mass of the system.

((1+1)+1+3+1+3)

3. (a) Define Young's modulus of elasticity. State Hooke's law of elasticity.
(b) State Stoke's law. What is Reynold's number?
(c) State Bernoulli's theorem.
(d) Write down equation of continuity.
(e) The length of a suspended ware increased by 10^{-4} of its original length when a stress of 10^7 Nm^{-2} is applied on it, Calculate the Young's modulus of the material of the wire.

((2+1)+(1+1)+2+1+2)

4. (a) Write down assumptions of the kinetic theory.
(b) Deduce the perfect gas equation.
(c) Find out the relation between rms speeds of the gas molecules with its temperature.

(3+5+2)

5. (a) Write down Zeroth law of thermodynamics.
(b) Write down second law of thermodynamics.
(c) Find out the expression of the efficiency of a Carnot engine.
(d) A Carnot engine takes in heat from a source at a temperature of 100^0 C and rejects heat to a sink at a temperature of 0^0 C. If the engine absorbs 1000 joules from the source, find the work done.

(1+2+4+3)

6. (a) Define Interference of light.
(b) Write down the conditions for observable interference pattern.
(c) Calculate the fringe width using Young's double slit experiment.

OR

In Newton's ring experiment, the diameter of m-th dark ring is 8 mm and the diameter of (m+5)th dark ring is 12 mm. If the radius of curvature of the lower surface of the lens is 10m, find the wavelength of light used.

(2+3+5)

7. (a) Find out the radius of a nucleus whose atomic mass number is 8.
(b) What is Binding energy of a nucleus. Describe how Binding energy of a nucleon depends on the

volume and the surface of a nuclei. (With proper mathematical description)
(c) Show that the nuclear mass density is independent of Mass number.
(d) State any two properties of nuclear force.
2+(1+2+2) +2+1

8. (a) Two protons with charge 1.6×10^{-19} c is separated within a nucleus at a distance 1.5×10^{-15} m. Find the electrostatic repulsion force between the protons and the potential energy of the system as well
(b) State the Gauss law of electrostatics and write its mathematical equation
(c) Two particles with charge +2c and +3c separated at a distance 20cm. Another particle with charge 1c is placed at a distance x from the particle with charge +2c on the line of joining where no force is acting on it. Find the value of x
4+3+3

OR
(a) What is a Bravais lattice? How many distinct types of Bravais lattices exist in 3-dimensional space?
(b) Show that the Packing fraction of a Body-centered cubic (BCC) lattices is $\frac{\sqrt{3}\pi}{8}$.
(c) A narrow beam of X-ray with wavelength 1.5 Å is reflected from an ionic crystal with an FCC lattice structure with a density of 3.32 gm/cm^3, The molecular weight is 108 amu. Find the lattice constant?
2+3+5

9. (a) State the Heisenberg Uncertainty Principle.
(b) The uncertainty of detecting the position of a particle is $\Delta x = 10\,nm$. Find the uncertainty of the momentum.
(c) A metal whose work-function(φ) is 4.2 eV is irradiated by radiation whose wavelength is 200 Å. Find the maximum Kinetic Energy of the emitted electrons?
(d) Say, the matter wave of a quantum particle as: $\psi(x,t) = Ae^{i(kx-\omega t)}$. Say the energy operator $\hat{E} = i\hbar\frac{\partial}{\partial t}$ and momentum operator is $\hat{p} = -i\hbar\frac{\partial}{\partial x}$. Using the given operators show that, the energy of the particle is $E = \hbar\omega = h\nu$ and momentum of the particle $p = \hbar k = h/\lambda$
2+2+2+4

10. (a) What is photoelectric effect? Write down the Einstein's equation of Photoelectric effect. Draw the curve between the Stopping Potential (V_s) and the frequency of incident light in the Photo Electric Effect?
(b) When Monochromatic light is shone on a clean metal surface, electrons are emitted from the surface due to the photoelectric effect. State and explain the effect on the emitted electrons of
(i) increasing the frequency of the light.
(ii) increasing the intensity of the light.
(c) A Sodium Vapor lamp emits light photons with a wavelength of $5.89 \times 10^{-7}m$. What is the energy of these photons?
4+4+2

11. (a) State de-Broglie hypothesis. Using the de-Broglie hypothesis, show that the wavelength λ of an alpha particle accelerated through a potential difference V is given by: $\lambda = \frac{h}{\sqrt{16m_p qV}}$, where m_p is the mass of a proton, q is the charge of a proton, and h is the Plank's constant.
(b) What are isobars? How do isotopes of an element differ from one another?
(c) The rate of decay of a radioactive substance is proportional to the number of nuclei present. Using $\frac{dN}{dt} = -\lambda N$, derive the formula $N = N_0 e^{-\lambda t}$, where N_0 is the initial number of nuclei and λ is the decay constant. Using the derived formula calculate the half-life ($t_{1/2}$)
3+2+5

ALIAH UNIVERSITY

Odd (Autumn) Examination 2025
Elementary Arabic and Islamic Studies
Course Code: UCCUGAU01

Full Marks: 80 Time: 3:00Hrs.

ARABIC

Q. 1. Attempt any ten questions, each question carries equal marks. 2x10=20

i. Identify the letters of the following words and split them: يَسْتَكْبِرُ، يُسْتَعْتَبُوْنَ
ii. Read the following words and write the pronunciations in English: يُمْسِكُهُنَّ، فَلَنُحْيِيَنَّهُ
iii. Merge the following letters to make word. م+س+ت+ق+ي+م، ي+س+ت+ط+ي+ع+و+ن
iv. Identify the following words either definite (المعرفة) or indefinite (النكرة) :
بَيْتٌ اَلْبُرُوْجُ، يَا كَرِيْمُ، جِسْرٌ
v. Identify the following words as they are 'Noun' (اسم) or 'Verb' (فعل) :
بِسْمِ اللهِ، لَنْ نَبْرَحَ، اَلْحَمْدُ، قَدْ نَرَى
vi. How many kinds of sentences are there in Arabic?
vii. Change the Gender of following words: طَبِيْبٌ ، صَفْرَاءُ ، مُهَنْدِسٌ، مُؤمِنَةٌ،
viii. Write any four demonstrative Pronouns (اسم الإشارة) of Arabic.
ix. How many kinds of Madd are in Arabic? And what are they?
x. What do you Know about *Tanween*? write in short with examples.
xi. Change the Nominal sentence into verbal sentence and Verbal sentence into Nominal Sentence as well. قَرَأَ الطَّالِبُ الكِتَابَ اَلْبِنْتُ رَجَعَتْ مِنَ الْمَدْرَسَةِ

Q. 2. Attempt any two questions, each of them carries equal marks. 10×2=20

i. Write about Gender in Arabic in details by citing of examples.
ii. Write the Arabic numbers 1-20 in Arabic scripts.
iii. Write down the Moon Letters (الحروف القمرية) and Sun Letters (الحروف الشمسية) in Arabic.

Islamic Studies

Answer any four Questions: 10x4=40

1. Write a short note about the life of Prophet Muhammad (PBUH).
2. How Many Pillars are there in "Islam"? Write in brief.
3. What is Tawheed? Define its types with example.
4. What do You Know about Zakat? To whom Zakat is Farz? Write a short note on it.
5. How Many Pillars of Iman? Write about all of them in short.

Aliah University
Electrical Engineering Department, B.Tech 3rd Year
Odd (Autumn) Semester Examination, 2024-25
Subject: Electrical Network Analysis; Code: EENUGPC01 (Regular + Supplementary)

TOTAL MARKS: 80 **TIME: 3 Hours**

INSTRUCTIONS: -

1. Mention the question number clearly. Answer all parts of a question at single location.
2. Draw circuits& waveforms wherever necessary.
3. Acronyms & symbols have their usual meaning unless otherwise specified.
4. Make suitable assumptions wherever necessary.
5. **Use separate answer scripts for Group A & Group B.**

Group--A **Marks:**
Answer any five questions **5x8=40**

Q-1 **a.** Explain Millman's theorem. **[5]**

b. Convert the voltage source shown in Fig. 1. to a current source with a proper diagram. **[3]**

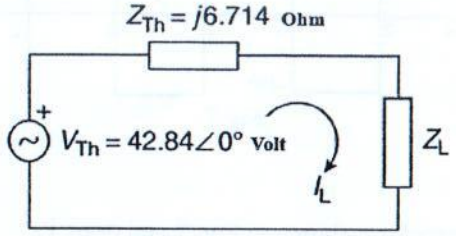


Fig. 1

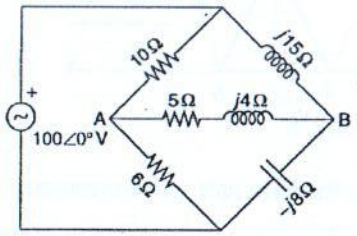


Fig. 2

Q-2 **a.** Write a short note on different types of inductors and their areas of application. **[5]**

b. Find out Norton's equivalent impedance from Fig. 2. considering (5 + j4) Ω as load impedance. **[3]**

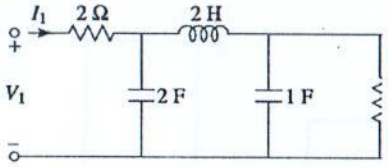


Fig. 3.

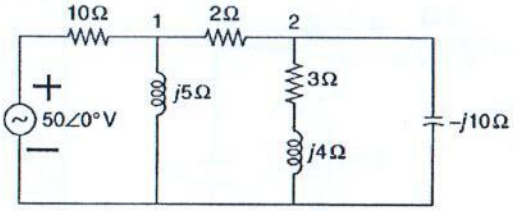


Fig. 4.

Q-3 **a.** Define bilateral and unilateral circuits with an example. **[3]**

b. Write the steps for finding out the maximum power from an AC network for variable load impedance. **[5]**

Q-4 **a.** Derive the reciprocity condition of a hybrid parameter of a two port network. **[4]**

b. How can the short circuit admittance parameters be obtained from the impedance parameters of a two-port network? **[4]**

Q-5 Determine the transmission line parameters of the network shown in Fig. 3. **[8]**

Q-6 Find the node voltages for the network shown in Fig.4 **[8]**

Q-7 **a.** Obtain the current I_x. **[5]**

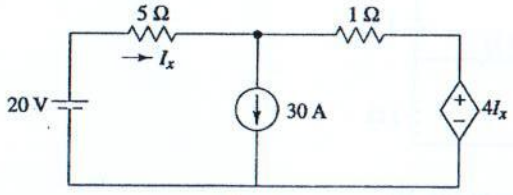


Fig. 5.

b. Describe the independent and dependent sources. **[3]**

Group–B

Answer any four questions.

Marks: 4x10=40

Q-8 **a.** Obtain the Laplace transform of the periodic waveform shown in Fig. 6. **[6]**

b. Find the inverse Laplace transform of the function $\boldsymbol{F(s) = \frac{s^2+3s+1}{(s+1)^2}}$ **[4]**

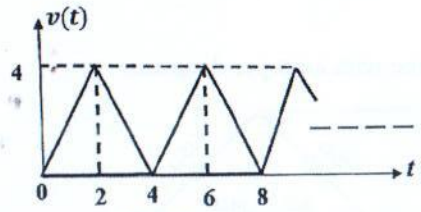


Fig. 6

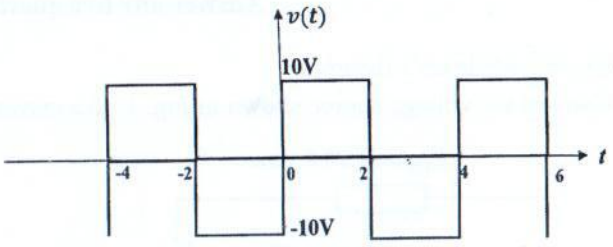


Fig.7

Q-9 **a.** Explain the term half-wave symmetry. **[2]**

b. Find the Fourier series expansion of the periodic waveform shown in Fig. 7 and draw its magnitude spectrum. **[8]**

Q-10 **a.** Find the initial value of the function $f(t)$ where $F(s) = \frac{2(s+1)}{(s^2+2s+5)}$. **[2]**

b. In the circuit of Fig.8, the switch **'S'** was in position **'a'** for a long time and moved to position **'b'** at t=0. Find the current through the capacitor for $t>0^+$. **[8]**

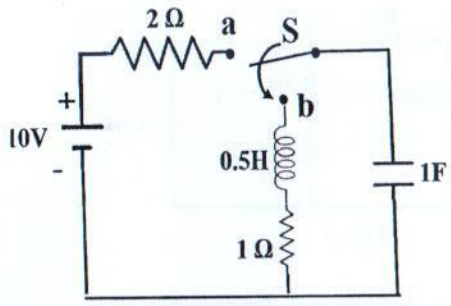


Fig. 8

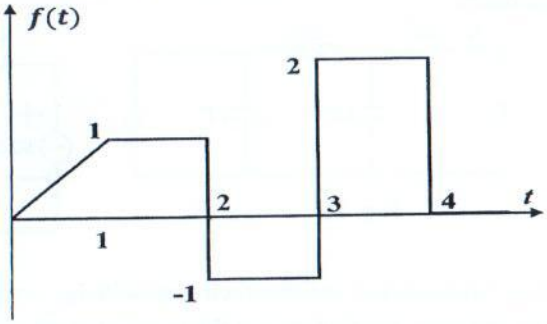


Fig. 9

Q-11 **a.** An initially relaxed *R-L* series network with $R = 10\Omega$ and $L = 1mH$ is switched on to a $(10e^{-t})V$ voltage source. Determine the current through the inductor at $t = 1$sec. **[6]**

b. Represent the signal $f(t)$ as shown in Fig. 9 in terms of unit step function. **[4]**

Q-12

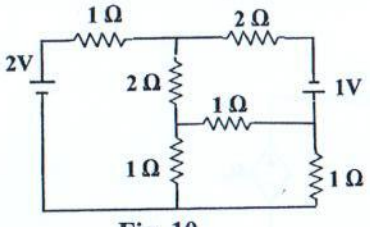


Fig. 10

Consider the network shown in Fig.10.

a. Draw the oriented graph of the network. **[2]**

b. Obtain a tie-set matrix by selecting a suitable tree. **[4]**

c. Show that the matrix equation $Q \times I_b = 0$ where Q is the cut-set matrix, I_b is branch current matrix. **[4]**

ALIAH UNIVERSITY

Electrical Engineering Department

Odd (Autumn) Semester Examination 2024-25 (Reg/ Supple)

Subject: Electromagnetic Fields (EENUGPC02)

Year: 2nd | Semester: III

Time: 3 hrs | Full Marks: 80

Instructions: Attempt Question no 1 and any FIVE questions from rest. Different parts of the same question must be answered in one place. Symbols have their usual meaning.

Ques. no		Statement of the Question	Marks
1	A)	Define capacitance.	2 × 10
	B)	State true/false $\left(\vec{A}\times\vec{B}\right)=\left(\vec{B}\times\vec{A}\right)$. Give reason.	
	C)	What is irrotational field?	
	D)	"An accelerated charge is a source of magnetostatic field"- state true or false with reasoning.	
	E)	Mention two features of electro-conductive system.	
	F)	Define different parameters in cylindrical co-ordinate system.	
	G)	The force between two point charges is *200 N*. If the distance between the charges is made triple, calculate the new force.	
	H)	What do you mean by dynamically induced emf?	
	I)	Direct the following vectors on XY- plane: $\vec{A}=-2\hat{a}_x+2\hat{a}_y$ $\vec{B}=-2\hat{a}_x-2\hat{a}_y$	
	J)	Sea water has $\varepsilon_r=80$. Calculate its permittivity.	
2		Evaluate gradient of U, divergence of $\vec{A}$, curl of $\vec{B}$ and laplacian of V fields as mentioned below: $U=5re^{-5z}\sin 2\phi$ $\vec{A}=rz^2\cos\phi\,\hat{a}_r+2z\sin^2\varphi\,\hat{a}_z$ $\vec{B}=xy\,\hat{a}_x+3y^2\,\hat{a}_y-5xz\,\hat{a}_z$ $V=5r^2\sin\theta\sin\phi$	3 × 4
3	A)	Using differential length, find the length (m) of the following curve: $r=2m,\ \theta=45^\circ,\ 30^\circ\le\phi\le60^\circ$	2 + 3 + 7
	B)	Using differential surface, evaluate the area (m^2) of the following surface: $r=2.5m,\ 45^\circ\le\theta\le135^\circ,\ 0\le\phi\le180^\circ$	
	C)	Two extensive homogeneous isotropic dielectrics meet on plane $z=0$. For $z>0$, $\varepsilon_{r1}=6$, and for $z<0$, $\varepsilon_{r2}=2.5$. An uniform electric field $\vec{E}_1=2\hat{a}_x-3\hat{a}_y+5\hat{a}_z\ (kV/m)$ exists for $z\ge0$. Find (I) $\vec{E}_2$ for $z\le0$, (II) The angles $\vec{E}_1$ and $\vec{E}_2$ make with the interface, (III) The energy densities $\left(J/m^3\right)$ in both the dielectrics	

4 **A)** It is given $V = 10x^2yz^3$ and $\varepsilon = 2.1\varepsilon_r$. Find (I) $\vec{E}$ at point P (-3, 1, 2), (II) ρ_V at P **7 + 5**

B) Point charges *5mC* and *-2 mC* are located at (-1, *-1, 5*) and (3, 2, 0) respectively. Calculate the electric force on a *10 nC* charge located at (*5, -4, 2*).

5 **A)** State Divergence theorem. **2 + 10**

B) Given that, $\vec{D} = zr\cos^2\phi\,\hat{a}_z\ C/m^2$. Calculate the charge density at $(1, \pi/6, 0)$ and the total charge enclosed by the cylinder of radius 10 *m* with $-5 \le z \le 5m$.

6 **A)** If $\vec{J} = \frac{1}{r^3}\left(2\cos\theta\,\hat{a}_r + \sin\theta\,\hat{a}_\theta\right)\left(\frac{A}{m^2}\right)$. Calculate the current passing through a hemispherical shell of radius $r = 5m$, $0 \le \theta \le \pi/3$, $0 \le \phi \le 2\pi$ **7 + 5**

B) Derive Poisson's and Laplace's equation

7 **A)** Find the work done in moving a point charge Q = *-10 nC* from origin to (4, 2, 0) in the field $\vec{E} = 2(x+4y)\hat{a}_x + 8x\,\hat{a}_y\left(\frac{V}{m}\right)$ **10 + 2**

B) State Lenz's law.

8 **(A)** Compare electric and magnetic circuit. **4 + 8**

(B) The magnetic circuit shown in Fig. 1 has a current of *5A* in the coil of *4000* turns. Assume that all branches have same cross section of *1.5 cm²* and the material of the core is iron with $\mu_r = 1500$. Calculate reluctance, MMF and flux in the core and air gap of *1 cm* long as shown.

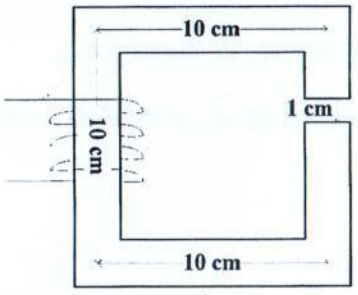


Fig 1

----- END OF QUESTION PAPER -----

B.Tech. Examination-2024-25

Electronics and Communication Engineering Department

(Odd Semester Regular and Supplementary)

Course Title - Analog Electronics Course Code - (ECEUGPC01)

Full Marks : 80 **Time-3 hrs**

(Answer any five taking at least one from each group, Symbols have their usual meaning)

Group A

1. (a) Explain the pinch-off and channel length modulation in n-channel MOSFET. Show that saturation region drain current expression in n-channel MOSFET with channel-length modulation is 4+5

$$I_D = \frac{1}{2}\mu_n C_{OX} \frac{W}{L} (V_{GS} - V_{TH})^2(1 + \lambda V_{DS})$$

(b) Determine the contact potential in an abrupt Si p-n junction with $N_a = 10^{18} cm^{-3}$ in one side and $N_d = 5 \times 10^{15} cm^{-3}$ on the other at room temperature. 5

(c) Show that in BJT operating in active region $\beta = \frac{\alpha}{1-\alpha}$. 2

2. (a) Determine the Q-point $(V_{CEQ}, I_{CQ}, I_{BQ})$ in self bias Si-BJT circuit having $V_{CC} = 10V$, $R_1 = 5.6k\Omega$, $R_2 = 1k\Omega$, $R_C = 4.7k\Omega$, $R_E = 1k\Omega$ & $\beta = 10$. Draw the load line and Q-point of the circuit. 8

(b) Explain thermal runaway in BJT. 2

(c) Show that stability factor with respect to I_{CO} in self bias BJT circuit is 6

$$S_{I_{CO}} = \frac{\beta + 1}{1 + \beta \frac{R_E}{R_T + R_E}}$$

Group B

3. (a) Show that small signal voltage gain of the circuit shown in fig. 1 is 6

$$A_v = -(g_m R_C)\left(\frac{r_\pi}{R_B + r_\pi}\right)$$

(b) Calculate the small-signal voltage gain of the BJT circuit shown in fig.1, with the parameters: $\beta = 100, V_{CC} = 12V, V_{BE} = 0.7V$, $R_C = 6k\Omega$, $R_B = 50k\Omega$, and $V_{BB} = 1.2V$. 10

4. (a) Show that the overall gain of the positive feedback amplifier is $A_{f+} = \frac{A}{1 - A\beta}$. 4

(b) Show that negative-feedback increases the stability of the feedback amplifier. 3

(c) Estimate the input impedance Z_{if} and output impedance Z_{of} of voltage–series feedback. 4+4

5. (a) Draw the common emitter configuration based voltage divider bias network for the ac response with the r_e model inserted between the appropriate terminals by including r_0 and derive the expression of Z_i, Z_0 and A_v. 10

(b) A voltage-divider bias network based on CE configuration has the following specifications such as $V_{CC} = 16V$, $R_1 = 39k\Omega$, $R_2 = 4.7k\Omega$, $R_C = 3.9k\Omega$, $R_E = 1.2k\Omega$ & $\beta = 100$ and $C_1 = C_2 = 1\mu F$, $C_E = 10\mu F$. For this network determine the following parameters using the r_e model of transistor 6

(i) r_e (ii) Z_i (with $r_o = \infty$) (iii) Z_0 (with $r_0 = \infty$) (iv) A_v

Group C

6. (a) State Barkhausen criteria for oscillation. 3

(b) Determine the frequency of oscillation of the circuit shown in Fig. 2. 6

(c) Derive the necessary formula. 7

7. (a) Identify the oscillator circuit and estimate the frequency of oscillation shown in Fig. 3. 1+6

(b) What is the gain of the amplifier in sustain oscillation condition of the oscillator ? 4

(c) Explain why Clapp oscillator has more accurate and stable frequency of oscillation than Colpitts oscillator. 5

Group D

8. (a) Determine the output voltage for the log amplifier in Fig. 4. Assume $I_R = 50nA$. 5
   (b) Find the input-output relation of the circuit shown in Fig. 5. 5
   (c) Find out the output voltage V_O of the circuit shown in Fig. 6. 6

9. (a) Draw and explain the operation of pulse-generator using OPAMP with waveform diagram. 2+5
   (b) Derive the expression for the pulse duration of output waveform. 6
   (c) How the amplitude of the output can be adjusted with back-to-back Zener diodes. 3

10.(a) Calculate the frequency of oscillation and duty-cycle of astable multivibrator using IC-555 timer having parameters $R_A = 4.7k\Omega$, $R_B = 3.3k\Omega$ and $C = 0.01\ \mu F$. 5+5
   (b) Derive the necessary formula. 6

11.(a) With help of appropriate circuit diagrams explain active low pass filter, active high pass filter, band pass and band stop filter. 8
   (b) Explain the operation of square wave generation process using Op-Amp with appropriate waveform diagram. 8

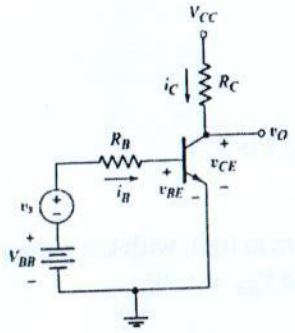


Fig. 1

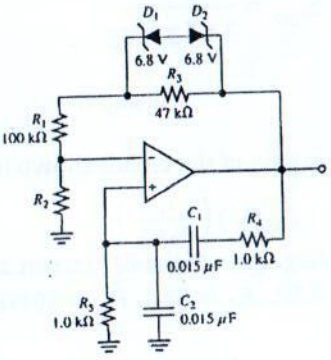


Fig.2

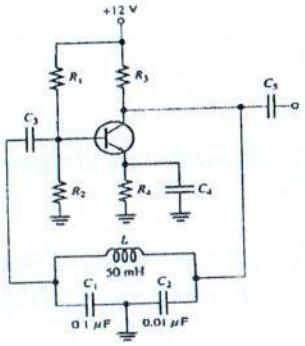


Fig. 3

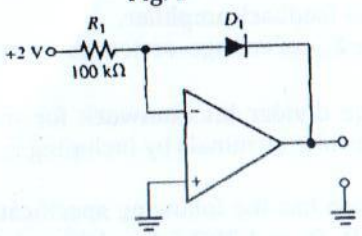


Fig. 4

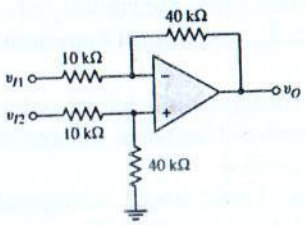


Fig. 5

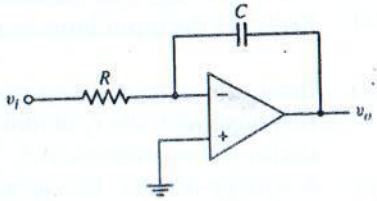


Fig. 6

AliahUniversity

Department of Electrical Engineering
B.Tech 2nd Year, 3rdSemester Examination–2024

Paper Name: Data Structure and Algorithms **Full Marks: 80**
Paper Code: CSEUGOE01 **Time: 3hrs**

NB: Answers of each Group should be together and answers of all parts of a question number must also be together as well.

Group-A

10×1=10

1. (Answer *all* questions)
   i) Process of inserting an element into stack is called _____.
   ii) What is the index no. of the last element in an Array having 7 elements?
   iii) What is the condition for a connected graph G with *v* vertices and *e* edges that have no cycles?
   iv) What is the overflow condition of a Queue implemented using an array?
   v) A Queue follows _____ principle.
   vi) How many nodes are there in a full binary tree with *n* leaves?
   vii) *Insertion* of an element *at end* in a *doubly linked list* requires the modification of how many pointers?
   viii) What type of memory allocation is referred for linked list?
   ix) What is the best case complexity for the *Insertion Sort* algorithm?
   x) What do you mean by the term *sparse matrix*?

Group-B

(Answer any *five* questions) **5×6=30**

2. Define Circular Queue and Circular Linked list. Consider the following operation performed on a stack of size 5. TOP = 7 and the STACK is: 1, 7, _, _, _
   i) POP(STACK, *ITEM_A*)
   ii) PUSH(STACK,8)
   iii) PUSH(STACK, *ITEM_A*-2)
   iv) POP(STACK, *ITEM_B*)
   After performing the operation what will be the value for *ITEM_A* and *ITEM_B*? **(4+2)**

3. Define the term ADT. Differentiate Linear and Non-linear Data structure. Write the steps to delete a node from the beginning in a singly linked list. **(1+2+3)**

4. Sort the list ofelements using *Bubble sort* algorithm mentioning all the steps. Elements: 28, 6, 4, 2, 24.

5. Define *worst case* complexity for an algorithm and write its order for selection sort algorithm. Suppose the following sequences list the notes of a binary tree T in preordered and inorder respectively;
   Inorder: G B Q A C K F P D E R H Preorder: Q B K C F A G P E D H R
   Draw the diagram of the tree. **(2+4)**

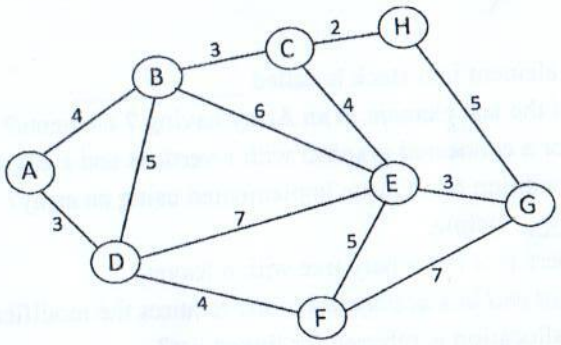
6. Construct the AVL tree for the following elements specifying the various rotations and balance factors used for each element. Sequence: 51, 26, 11, 6, 8, 4, 31, 21

7. Define Hashing Function? Elements *37, 38, 72, 48, 98, 11, 56* are inserted into an empty hash table with hash function h(key) = key mod 7 with linear probing. What is the index for 11 in this hash table? **(1+5)**

Group-C

(Answer any four questions) **4×10=40**

8. What are the types of shortest path algorithms? Find the Minimum Spanning Tree (MST) using *Prim's algorithm*. Show all the steps. How many edges are present in the complete graph of n vertices? **(3+6+1)**



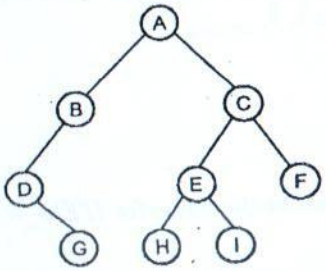
9. A) Write down the steps to convert an Infix expression to postfix form using *stack*.

Expression: $A + B * C / D - F + A \wedge E$

B) Evaluate the following *postfix* expression: (3 1 +2 ^ 7 4 – 2 * + 5 -)

C) Which graph traversal algorithm uses stack for its implementation? **(6+3+1)**

10. Define the terms *Degree of a node*, *Degree of a Tree*, *Terminal Node* and *Level* in relation to *Tree* terminology. Write inorder, preorder, postorder traversal of the following tree. **(4+6)**



11. A) Consider an array with the following elements.

45, 26, 77, 14, 68, 61, 97, 39, 99, 90

What are the elements presents in two sub arrays after 1st pass using *Quick Sort?*

B) Sort the above array of elements using *Radix Sort*. **(7+3)**

12. A) Write a short note on different algorithm design techniques.

B) Explain the term *Adjacency matrix* and *BFS* in a Graph with example. **(5+5)**

Aliah University
End-Semester Examination - 2024 (Autumn)
Paper Code: MATUGBS03 Engineering Mathematics III
Semester – III (B.Tech. in CEN, MEN, ECE, EEN)

Full Marks – 80 **Time – 3 Hours**

Notations and symbols have their usual meaning.

Section A. Answer ALL questions. Each question carries one mark. $1 \times 10 = 10$

1. The transformed equation of $3x+4y=5$ due to change of origin to the point $(3,-2)$ is .....
2. What is the angle between the lines $y^2+xy-2x^2=0$?
3. Give the condition that a given line $y=mx+c$ may touch the parabola $y^2=4ax$.
4. Find the equation of the chord of $x^2+y^2=81$, which is bisected at $(-2,3)$.
5. Find the distance of the plane $4x+3y+12z+16=0$ from the point $(1,2,0)$.
6. The Laplace transform of the function $e^x sin6t$ is .....
7. Find the degree and order of $\frac{\partial^2 z}{\partial x^2}+\left(\frac{\partial^2 z}{\partial x \partial y}\right)^2=0$.
8. Classify the given partial differential equation $\frac{\partial^2 z}{\partial x^2}+4\frac{\partial^2 z}{\partial x \partial y}+4\frac{\partial^2 z}{\partial y^2}=0$.
9. Write down the Charpit's auxiliary equation.
10. Find Fourier sine transform of $F(x)=e^{-ax}$, $a \geq 0$.

Section B. Answer any SEVEN questions. Each question carries 5 marks. $5 \times 7 = 35$

11. The equation $3x^2+2xy+3y^2-18x-22y+50=0$ is reduced to $4x^2+2y^2=1$ when referred to rectangular axes through the point $(2,3)$. Find the inclination of the latter axes to the former.
12. Show that area of the triangle formed by the lines $ax^2+2hxy+by^2=0$ and $lx+my+n=0$ is $\frac{n^2\sqrt{h^2-ab}}{am^2-2hlm+bl^2}$.
13. Show that the equation $8x^2+10xy+3y^2+26x+16y+21=0$ represents a pair of straight lines and find the point of intersection and angle between them.
14. Reduce $11x^2-4xy+14y^2-58x-44y+71=0$ to canonical form and state the type of the conic.
15. Show that four normals can be drawn to an ellipse through a given point and the feet of the normals lie on a rectangular hyperbola.

16. Find the locus of the poles of the normal chords of parabola $y^2 = 4ax$.

17. Two tangents drawn to $y^2 = 4ax$ meet at angle 45°. Find the locus of their point of intersection.

18. (a) Find the equation of plane parallel to x-axis and passing through the points $(1,-2,4)$ and $(3,-4,5)$.

    (b) Find the angle between the planes $2x+y+z=6$ and $x-y+2z=3$. 3+2

19. (a) Find the shortest distance between the straight lines $\frac{x-3}{2} = \frac{y+15}{-7} = \frac{z-9}{5}$ and $\frac{x+1}{2} = \frac{y-1}{1} = \frac{z-9}{-3}$.

    (b) Find the equation of the straight line through the point $(3,1,-6)$ and parallel to each of the planes $x+y+2z-9=0$ and $2x-3y+z+5=0$. 3+2

20. Find the equation of the sphere through the four points $(4,-1,2),(0,-2,3),(1,-5,-1)$ and $(2,0,1)$.

Section C. Answer any SEVEN questions. Each question carries 5 marks. $5 \times 7 = 35$

21. By eliminating three arbitrary constants a,b, c from the family of ellipsoids

    $x^2/a^2+y^2/b^2+z^2/c^2 = 1$, obtain

$$zx\frac{\partial^2 z}{\partial x^2}+x\left(\frac{\partial z}{\partial x}\right)^2-z\frac{\partial z}{\partial x} = 0; \quad zy\frac{\partial^2 z}{\partial y^2}+y\left(\frac{\partial z}{\partial y}\right)^2-z\frac{\partial z}{\partial y}=0; \quad z\frac{\partial^2 z}{\partial x\partial y}+pq=0.$$

22. Find the partial differential equation arising from $\phi(\frac{z}{x^3},\frac{y}{x}) = 0$.

23. Find the general solution of $z(x+y)p+z(x-y)q = x^2+y^2$ by Lagrange's method.

24. Find the integral surface of the linear partial differential equation of $x(y^2+z)p-y(x^2+z)q = (x^2-y^2)z$, which contains the straight line $x+y=0, z=1$.

25. Find the fourier series to represent $F(x) = e^{ax}$ in $(0,2\pi)$.

26. Find the Fourier Sine Transform of

$$f(x) = e^{-ax}, a \geq 0.$$

    Also show that

$$\int_0^\infty \frac{x\sin mx}{x^2+a^2}dx = \frac{\pi}{2}e^{-ma}.$$

27. Eliminate the arbitrary function f and obtain partial differential equation for the following:

    (a) $x+y+z = f(x^2+y^2+z^2) \quad z = f(x^2-y^2)$.

28. Find the Laplace transform of (a) $tcos^2 3t$ and (b) $e^{-4t}sin3t$.

29. Find the Fourier transform of

$$\begin{aligned} F(x) &= 1-x^2, |x| \leq 1 \\ &= 0, |x| > 1. \end{aligned}$$

30. Find the complete integral of $pxy+pq+qy = yz$ by Carpit's method.

——— End ———

Aliah University

Theoretical Examination, 2024
UG section (Science & Engg/Autumn Semester)
Sub: Indian Constitution (UCCUGAU03)

Full Marks: 80 Time: 3hrs

A. Write any ten questions: (within 30 words each). 2x10=20

1. What is the significance of the Preamble of the Constitution of India?
2. Define 'Fundamental Rights'.
3. When was Abolition of the Untouchability Act enacted?
4. Discuss Article 21A of the Constitution of India.
5. Mention any two Socialist Principles of the Directive principles of State Policy.
6. Write two differences between Fundamental rights and Directive principle of state policy.
7. Discuss any two functions of the Speaker of the Lok Sabha.
8. What is impeachment? Has any President of India ever been impeached?
9. Mention the qualifications required to become a member of the Rajya Sabha.
10. Discuss the composition of the Upper House of the Indian Parliament.
11. Why the judgement in Kesavananda Bharti case considered one of the most celebrated judgements?
12. What is the significance of the 73rd Amendment to the Indian Constitution?
13. What are the primary functions of municipalities in India?

B. Write any four questions: (within 100 words each). 5x4=20

1. What are the differences between the Constitutional law and the Constitutionalism.
2. Write a short note on the writs of Habeas Corpus and Mandamus.
3. Describe the procedure for electing the President of India.
4. Mention Five Fundamental Duties enshrined in the Indian Constitution
5. Critically analyse the Right to Freedom of Religion as guaranteed under Articles 25to 28.
6. Write a short note on the 74th Amendment Act

C. Write any four questions: (Within 350 words each). 10x4=40

1. Discuss the basic features of the Indian Constitution and explain how they reflect the vision of its framers.
2. Explain Article 19 of the Indian Constitution and highlight its reasonable restrictions.
3. "The Constitution of India is neither purely federal nor unitary but a combination of both." Do you agree with this view? Justify your answer.
   Or,
   Discuss the nature of Indian federalism'
4. Discuss the emergency powers of the President of India as provided in the Constitution. How do these powers ensure national security?
5. Explain the composition and functions of the Gram Panchayat in the Panchayati Raj system.
6. Explain the procedure for amending the Indian Constitution. How does it balance rigidity and flexibility?

Aliah University

Department of Electrical Engineering

Odd (Autumn) Semester Examination, 2024 (Regular/Supplementary)

B. Tech. (CSE), 3rd Semester

CSE

Sub: Circuit Theory & Networks **Code- EENUGOE01**

Full Marks: 80 Duration: 3 hrs

Instructions: 1. Mention the question number clearly and write all the parts of a question at one place.
2. Draw circuit/figure wherever applicable.
3. Make suitable assumptions wherever necessary, symbols and notations have their usual meanings.

Section – I (Answer any five: 5 x 2 = 10 Marks)

1 **(A)** If it takes 35 J of energy to move a charge of 5 C from one point to another, what is the voltage between the two points?

(B) An electric heater consumes 1.8 MJ when connected to a 250 V supply for 30 minutes. Find the power rating of the heater and the current taken from the supply.

(C) What is the resistance of a coil which draws a current of (a) 50 mA and (b) 200 μA from a 120 V supply?

(D) An electric equipment takes a current of 13 A from a 240 V supply. Estimate the cost per week of electricity if the equipment is used for 30 hours each week and 1 unit of energy costs ₹ 8/-.

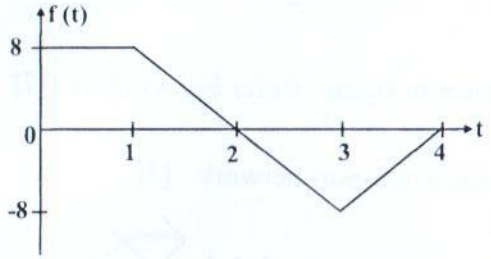
(E) A piece of wire of cross-sectional area 2 mm^2 has a resistance of 300 Ω. Find the cross-sectional area of a wire of the same length and material of resistance 750 Ω.

(F) At t=0, the voltage across a 50 mF capacitor is 10 V. Calculate the voltage across the capacitor for t>0 when current 4.t mA flows through it.

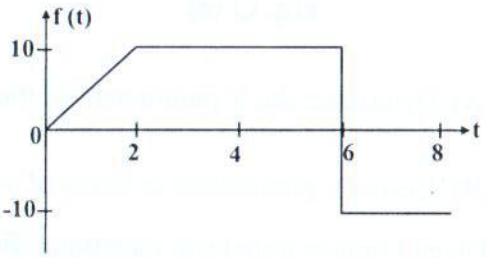
Section – II (Answer any five: 5 x 6 = 30 Marks)

2. Write the expressions for the following signals using basic signals. Show the construction steps graphically for each signal.

(i)

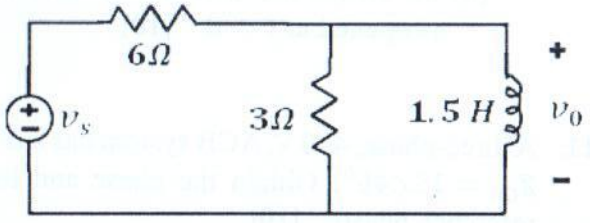


(ii)



3. With reference to the graph theory, explain the significance of an incidence matrix, with the help of an example. Find the number of possible trees for your considered example.

4. Using Laplace transform method, determine the unit step response $v_0(t)$ to v_s, in the given circuit.



5. Find the relation between phase voltage and line voltage of a three-phase balanced star-connected system. Use both graphical and equation methods for the calculation.

6. Find the voltage across 5 Ω resistance, using mesh current analysis method. Refer Fig. Q (6).

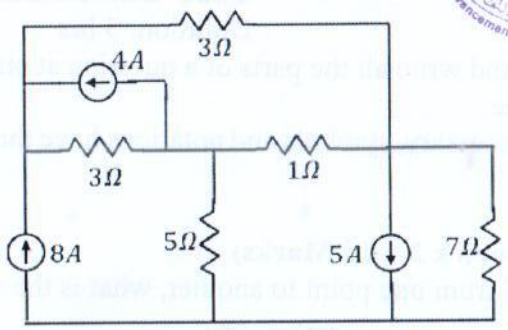


Fig. Q (6)

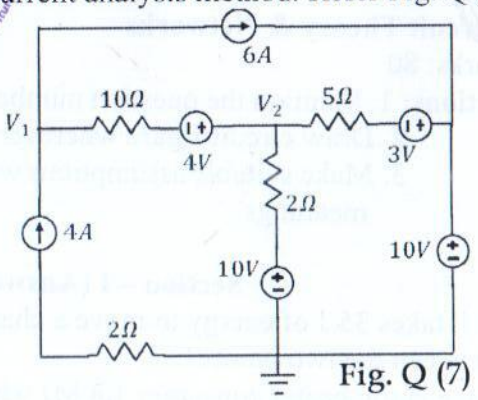


Fig. Q (7)

7. Determine the node voltages V_1 and V_2 in the given circuit, using node voltage analysis method. Refer Fig. Q (7).

Section – III (Answer any four: 4 x 10 = 40 Marks)

8. For the AC circuit shown in figure, find the currents I_1 and I_2. Refer Fig. Q (8). **[10]**

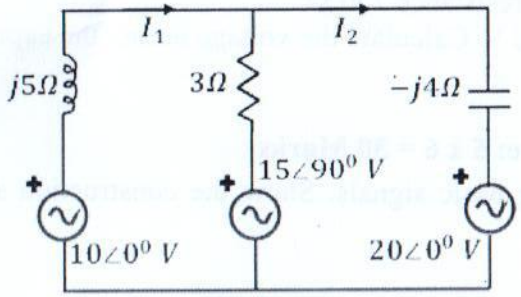


Fig. Q (8)

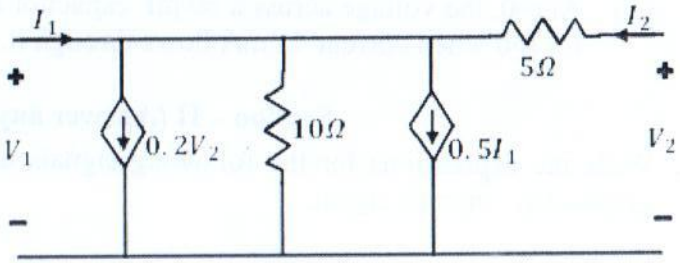
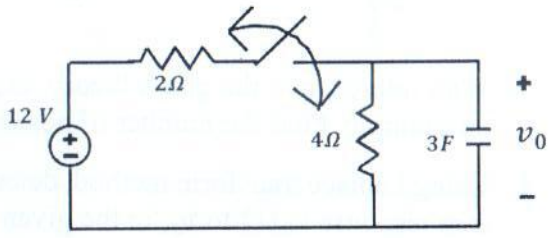


Fig. Q (9A)

9. **(A)** Determine the Y parameters of the network shown in figure. Refer Fig. Q (9A). **[7]**

(B) Derive h-parameters in terms of y-parameters for a two-port network. **[3]**

10. Using Laplace transform technique, find $v_0(t)$, if
    (a) the switch has been open for a long time and is closed at $t = 0$.
    (b) the switch has been closed for a long time and is opened at $t = 0$. **[10]**



11. A three-phase, 440 V, ACB system has a Δ-connected load, with $Z_{AB} = 12\angle 60^0$, $Z_{BC} = 15\angle 0^0$ and $Z_{CA} = 15\angle 45^0$. Obtain the phase and line currents and draw the phasor diagram. Take V_{AB} as reference phasor. **[10]**

12. **(A)** The load connected to a three-phase supply comprises three similar coils connected in delta. The line currents are 15 A and the kVA and kW inputs are 20 and 17.5 respectively. Find the phase voltages, the kVAR input and the resistance & reactance of each coil. **[5]**

(B) For a graph of your choice, establish the following relations: $[B][V_b] = 0$ and $[C][I_b] = 0$. **[5]**

MEN

Aliah University

Department of Electrical Engineering, B-Tech
End-Semester Examination, Autumn-2024 (Reg./Supple)
Subject: Introduction to Electrical Machines [**EENUGOE03**]

Full Marks: 80
Year: III

Time: 3 Hours
Semester: II

10x2=**20** Marks

1. a) What are the advantages of autotransformer over two winding transformers?
   b) What causes the buzzing or Humming Noise in transformers?
   c) How does 4-point starter differ from 3-point starter?
   d) What is the condition for maximum torque in induction motor?
   e) Why a single-phase induction motor does not self-start?
   f) Mention two basic speed control scheme of DC series motor?
   g) Can Induction motor run at synchronous speed? Explain.
   h) Can DC be applied to transformers?
   i) What are the conditions for parallel operation of D.C. generators?
   j) Differentiate between "capacitor start" & "Capacitor start capacitor run" single phase induction motor?

Answer any four questions

4x15=**60** Marks

2. a) Using the transformer principle, develop the per phase equivalent circuit of a three-phase induction motor. **8** Marks
   b) A three-phase, four-pole induction motor runs at a speed of 1440 rpm on 500 V, 50 Hz mains. The mechanical power developed by the rotor is 20.3 Hp. The mechanical losses are 2.23 Hp. Determine a) the slip, b) the rotor copper losses, and c) the efficiency. **7** Marks

3. a) Draw and explain the nature of speed-torque and torque-current characteristic of DC i) shunt motors b) series motors **7** Marks
   b) The ohmic resistance of the primary and secondary windings of a 27.5 kVA, 450/112 V single-phase transformer are 0.055 Ω and 0.00325 Ω respectively. At the rated supply voltage, the iron losses are 170 W. Calculate (a) the full-load efficiency at a p.f of 0.8 lagging, (b) the kVA output at which efficiency at a p.f of 0.8 (lagging), and c) the value of maximum efficiency at a p.f of 0.8 (lagging) **8** Marks

3x5= **15** Marks

4. Explain why:
   a) A DC Series motor should not be never run on no-load.
   b) Some parts of dc machines are laminated are some parts are not.
   c) Single-phase induction motors do not have self-starting torque.

5. a) Where do we require single-phase induction motors? What are the different methods of starting of a single-phase induction motor? 2+3=5 **Marks**
   b) A three- phase induction motor is supplying a mechanical load at a full load of 1170 rpm. The voltage supply to the motor is from a 10-pole synchronous generator, which is operating at synchronous speed of 720 rpm. Determine (i) the number of poles and (ii) per unit slip of the induction motor. **10** Marks

6. a) Derive from the first principle an expression for the torque developed in a d.c. motor. **6** Marks
   b) What is an ideal transformer? Draw and explain the phasor diagram at different loads for an ideal transformer. **9** Marks

7. a) Write a short note on Blocked-Rotor test of single-phase induction motor. **7** Marks
   b) A 6-pole DC Machine armature has 36 slots 2 coil-sides/slot, 8 turns/coil and is wave wound. The pole shoe is 18 cm long and the mean air-gap diameter is 25 cm. The average flux density over one pole pitch is 0.8 T. Find the gross torque and mechanical power output when the machine is operating as a motor at 1200 rpm with an armature input current of 10 A. **8** Marks

Aliah University
Department of Electrical Engineering
Odd (Autumn) Semester Examination 2024 (Regular/Supplementary)

Sub: Power Electronics **Code- EENUGPC07**

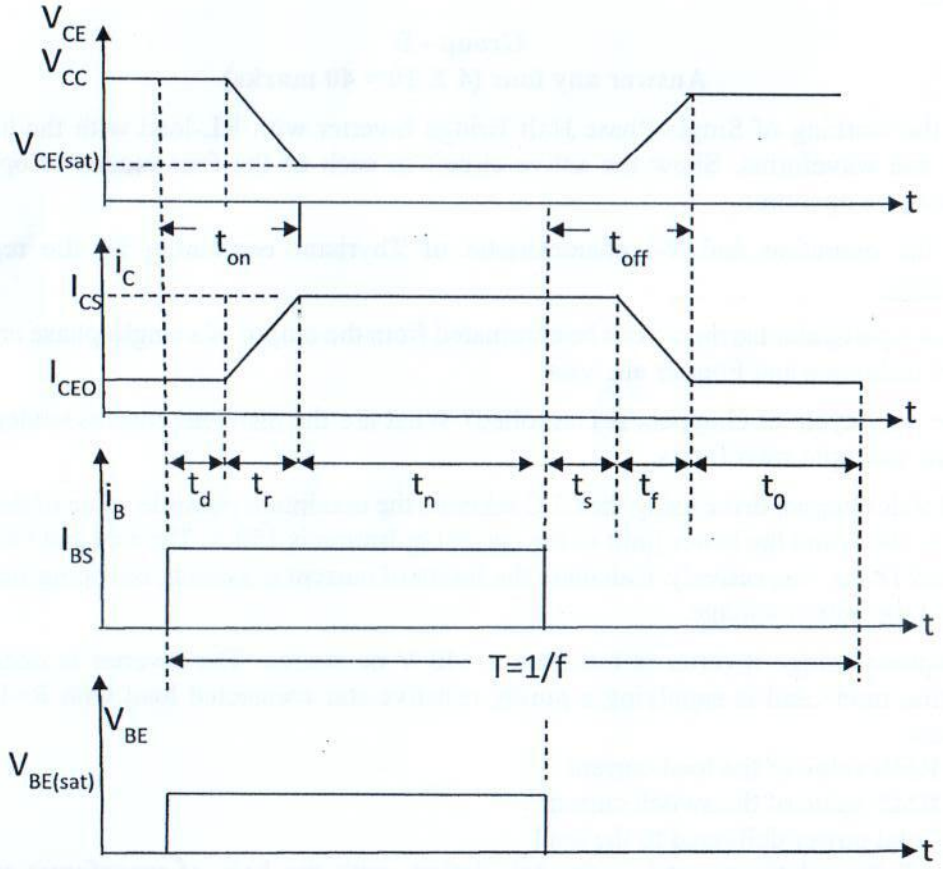
Full Marks: 80 Duration: 3 hrs

Instructions:
1. **Use separate answer scripts for two groups.**
2. Mention the question number clearly and write all the parts of a question at one place.
3. Write answers to the point, keeping in mind the allotted marks.
4. Draw circuit/figure & waveforms wherever applicable (including numerical).
5. Make suitable assumptions wherever necessary, symbols and notations have their usual meanings.

Group - A

Answer any Four (4 X 10 = 40 marks)

Que-1 **(A)** The waveforms of a transistor switch are shown in below figure. The parameters are Vcc=240V, $V_{BE(sat)}$ =4V, I_B=7A, $V_{CE(sat)}$=3V, I_{CS}=100A, t_d=0.4μs, t_r=1.1μs, t_n=50μs, t_s=3μs, t_f=2 μs and f=10kHz.The duty cycle k=50%. The collector to emitter leakage current I_{CEO}=2mA. Determine the average power loss due to collector current (i) during delay time t_d (ii) during rise time t_r 7



(B) Explain the working principle of n-channel depletion type MOSFET with its characteristics. 3

Que-2 **(A)** For a power diode the reverse recovery time is 3.9μs and the rate of diode-current decay is 50A/μs. For a softness factor of 0.3, calculate the peak inverse current and the storage charge. 5

(B) Define Snappy Recovery Diode and Soft Recovery Diode. **2**

(C) Compare General Purpose Diode and Schottky Diode. **3**

Que-3 **(A)** For a three-phase full wave rectifier, sketch the input voltage waveforms for vab, vac, vbc, vba, vca, vcb etc. and the output voltage for a firing angle $\alpha=60°$, also show the conduction period of thyristors (use graph paper). **8**

(B) What are the differences in single phase mid-point full wave rectifier with the single phase full wave bridge rectifier circuit? **2**

Que-4 **(A)** Describe the principle of phase control in single-phase half-wave ac voltage controller. Derive expressions for the average and rms value of output voltage for this voltage controller. **6**

(B) For a single-phase ac voltage controller, discuss how pulse gating is suitable for R load and not for RL load. Hence show that high frequency carrier gating is essential for RL load. **4**

Que-5 **(A)** Describe the basic principle of working of single-phase-to-single-phase step up cycloconverter where output frequency is four times the input frequency, for a mid-point type cycloconverter. Mark the conduction of various thyristors also (use graph paper). **8**

(B) State the requirement of commutation (force/natural) of thyristor for step-up and step-down cycloconverter. **2**

Group - B
Answer any four (4 X 10 = 40 marks)

Que-7 **(A)** Explain the working of Single-Phase Half Bridge Inverter with RL-load with the help of circuit diagram and waveforms. Show the active circuit in each of the four modes of operation for a complete cycle operation. **5**

(B) Explain the operation and V-I characteristic of Thyristor explaining all the regions of the characteristic. **5**

Que-8 Discuss, how a particular harmonic can be eliminated from the output of a single-phase bridge inverter, using PWM technique and Fourier analysis. **10**

Que-9 **(A)** How the duty cycle of choppers is controlled? What are the different control strategies? Explain them with example waveforms. **7**

(B) In a 200 V dc chopper drive using the CLC scheme, the maximum possible value of the accelerating current is 260 A and the lower limit of the current pulsation is 150 A. The ON and OFF periods are 11 *ms* and 18 *ms*, respectively. Calculate the limits of current pulsation, chopping frequency, duty cycle and the output voltage. **3**

Que-10 **(A)** A three-phase bridge inverter is fed from a 440 V dc source. The inverter is operated in 180^0 conduction mode and is supplying a purely resistive star connected load with R=19.5 Ω/phase. Determine: **7**

a. RMS value of the load current
b. RMS value of the switch current
c. Total power delivered to the load

Explain all the relations, used in the calculation, with the help of waveforms and necessary derivation(s).

(B) Define the terms Harmonic Factor, Lowest Order Harmonic & Total Harmonic Distortion in relation with performance of inverters. **3**

Que-11 Draw and explain the operation table (table indicating the conducting switches, phase voltages & line voltages in each of the six modes) for a three-phase inverter in 120^0 mode of operation. Using graph paper, draw the gate currents and phase and line voltages for the said inverter. **10**

Aliah University

Odd (Autumn) Semester Examination, January 2025

Subject: Control System; Code: EENUGPC08 (Regular + Supplementary)

Department: EE & ECE; 3rd Year; 5th Semester

TOTAL MARKS: 80 **TIME: 3 Hours**

INSTRUCTIONS: -

1. Mention the question number clearly. Answer all parts of a question at single location.
2. Draw block diagram & waveforms wherever necessary.
3. Acronyms & symbols have their usual meaning unless otherwise specified.
4. Make suitable assumptions wherever necessary.
5. **Use separate answer scripts for Group A & Group B (ECE students only).**

Group A — 5×10=50

Answer Question-1 and any four from the rest.

Q-1 ***Answer any five questions.***

(a) Explain the term feedback as applied to control systems. [2]

(b) What is BIBO stability criterion? [2]

(c) Give examples of open-loop and closed-loop control system. [2]

(d) The transfer function of a system is $G(s) = \frac{100(s+5)(s+50)}{s^4(s+1)(s^2+2s+2)}$. Write type and order of the system. [2]

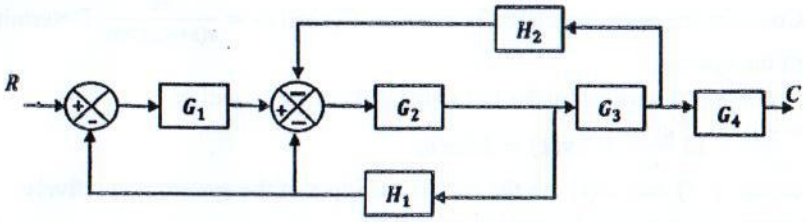
(e) The expression of unit step response of a system is given by $c(t) = (1 - e^{-8t})$. Determine the transfer function of the system. [2]

(f) What do mean by analogous system? In force-voltage analogy, mass is analogous to _____. [2]

(g) What is quadrantal symmetry of a polynomial? [2]

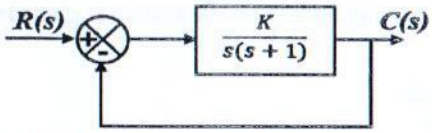
Q-2 (a) Define linear system. [2]

(b) Determine the overall transfer function $\left(C/R\right)$ of the system shown in Fig. below. [8]



Q-3 (a) The open-loop transfer function of a negative unity feedback system is $G(s) = \frac{144}{s(s+12)}$. Determine its transient response specifications for a unit step input. [6]

(b) Determine the range of values K for the system shown in Fig. below so that steady-state error $e_{ss} < 0.004$ when $r(t) = 0.2t$. [4]



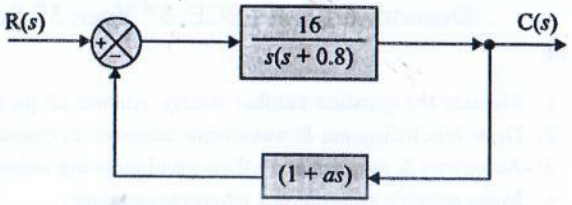
Q-4 (a) Write the limitations of Routh's stability criterion. [2]

(b) A unity feedback system has $G(s) = \frac{K}{s(s+1)(s+2)(s+4)}$. Find the following using Routh-Hurwitz's criterion: [8]

i. the range of K for stability.
ii. the value of K for marginal stability and
iii. the poles on the imaginary axis of the s-plane (for marginal stability).

Q-5 (a) Explain a DC potentiometer with a suitable diagram. [4]

(b) Consider the system shown in Fig. below. Determine the value of a such that the damping ratio is 0.5. Also, obtain the values of the rise time and maximum overshoot in its step response. [6]



Q-6 (a) Draw the op-amp realization circuit of proportional-derivative (PD) controller and derive its transfer function. **[4]**

(b) Derive the transfer function $G(s) = \frac{\omega(s)}{E_a(s)}$ of an armature-controlled D.C. motor where $\omega(s)$ is the angular velocity of the rotor shaft and $E_a(s)$ is the external voltage applied to the armature winding of the motor. **[6]**

Q-7 A negative unity feedback control system has an open-loop transfer function $G(s) = \frac{K}{s(s^2+2s+2))}$. **[10]**
Sketch the root locus of the system as K is varied from 0 to ∞ and determine the maximum value of K for stability.

Group B

3×10=30

Answer any three questions.

Q-8 Sketch the asymptotic Bode plot for the open-loop transfer function $G(s)H(s) = \frac{40}{s^2(s+4)(s+10)}$. Also determine its gain margin (GM), phase margin and stability of the closed-loop system (use semilog graph paper). **[10]**

Q-9 Sketch the Nyquist plot and determine stability of the closed-loop system whose open-loop transfer function is $G(s)H(s) = \frac{12}{(s+1)(s+2)}$. **[10]**

Q-10 (a) Define gain crossover frequency. **[2]**

(b) Consider the open-loop transfer function $G(s)H(s) = \frac{10}{s(s+4)(s+8)}$. Determine gain margin (GM) of the system. **[8]**

Q-11 (a) A system is described by the following differential equation **[5]**

$$\frac{d^3y(t)}{dt^3} + 11\frac{dy(t)}{dt} + 5y(t) = 10u(t)$$

where $y(t)$ and $u(t)$ are the output and input of the system respectively.
Represent the system by state-space model.

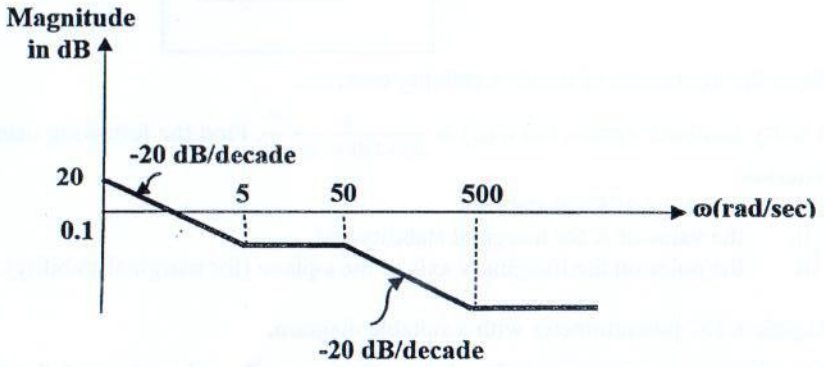
(b) A system is described by the state equation **[5]**

$$\dot{X}(t) = \begin{bmatrix} 0 & 1 \\ -1 & -2 \end{bmatrix} X(t) + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u(t); y(t) = [1 \quad 0]X(t)$$

Determine the transfer function of the system.

Q-12 (a) Write the advantages of Bode plot. **[2]**

(b) The asymptotic Bode magnitude plot of a system is given below. Determine its transfer function. **[8]**



ALIAH UNIVERSITY

Electrical Engineering Department

End Semester (autumn) Examination 2024 (Regular/Supplementary)

Subject: Power Systems I (EENUGPC09)

Time: 3 hrs | Full Marks: 80

Instructions:

1. **Use separate answer scripts for two groups.**
2. Mention the question number clearly and write all the parts of a question at one place.
3. Write answers to the point, keeping in mind the allotted marks.
4. Draw circuit/figure & waveforms wherever applicable (including numerical).
5. Make suitable assumptions wherever necessary; symbols and notations have their usual meanings.
6. For **Question no. 5** of **Group-B**, a symbol μ is introduced. It means last two digit of the candidate's class roll number.

Group A: Answer any three questions (3 × 10 = 30 marks)

1 (A) Derive the expression for the calculation of sag for the supports at equal level. **5**

1 (B) A transmission line conductor consists of a hard-drawn copper of 225 mm^2 cross-section and has a span of 160 m between level supports. The conductor has an ultimate tensile strength of 49.3 kg/mm^2 and allowable tension is not to exceed $1/5^{th}$ of the ultimate tensile strength. Determine the sag. Also determine the sag when the conductor has an ice coating of 0.9 cm thickness along with the wind effect of 1.1 kg/m. Take the specific gravity of hard-drawn copper as 8.9 gm/cc and the weight of ice as 912.5 kg/m^3. **5**

2 (A) Derive the expression for the critical disruptive voltage in a transmission line. **5**

2 (B) Determine the critical disruptive voltage and the visual critical voltage for the local and general corona on a three-phase overhead transmission line consisting of three stranded copper conductors spaced 3.1 m apart at the corners of an equilateral triangle. Air temperature and pressure are 23.2 ^{0}C and 77 cm of Hg respectively. Conductor diameter is 2.4 cm. Irregularity factor m_0 is 0.83 and surface factor m_v is 0.74 and 0.84 for local and general corona respectively. Take breakdown strength of air as 30.5 kV(peak)/cm. **5**

3 (A) A 2-wire dc distributor AB, of 1.2 km length, is uniformly loaded at the rate of 1.1 A/m and is fed at both the ends. The point of minimum potential is at 562 m from end A and the minimum potential is 222.5 V. Calculate the voltages at the feeding ends A and B. Take resistance of each conductor as 0.045 Ω/km. **5**

3 (B) A 2-wire dc ring main is fed at P and loads are tapped at points Q, R and S. The distributor length is 450 m long and points Q, R and S are 125 m, 200 m, and 375 m respectively from point P. The loads are 125 A, 50 A and 180 A respectively. If the resistance per 100 m of single conductor is 0.035 Ω and voltage at feeding point P is 235 V, calculate current in each section and voltage at each load point. **5**

4 (A) A 2-wire dc ring distributor is 300m long and is fed at 240 V at a point A. At point B, 150 m from A, a load of 120 A is taken and at C, 100 m in the opposite direction, a load of 80 A is taken. If the resistance per 100 m of single conductor is 0.03 Ω, find (i) current in each section of distributor and (ii) voltage at points B and C. **5**

4 (B) A single-phase distributor AB, two km long, has resistance and reactance per conductor of 0.12 Ω and 0.18 Ω, respectively. At the far end, the voltage $V_B = 210$ V and the current is 98 A at p.f. of 0.82 lagging. At the mid-point M of the distributor, a current of 120 A is tapped at a p.f. of 0.65 lagging with reference to the voltage V_M at the mid-point. Determine (a) supply end voltage V_A (b) phase angle between V_A and V_B. **5**

Group B: Answer any five questions (5 × 10 = 50 marks)

1	What is compensation in power system? What is the difference between series and shunt compensation? Explain the working principle of TCSC. To meet the increased load demand, how can you enhance the power transferring capability of a line without increasing the generation?	2 + 2 + 3 + 3
2	What are the lumped parameter and distributed parameter transmission line models? Derive the ABCD-parameters of distributed parameter line model.	2 + 8
3	Differentiate overhead and underground transmission system. Derive the optimum cable geometry configuration.	4 + 6
4	How you can reduce the dependency on the conventional energy sources like thermal? Mention the equation, based on which the flow of power from one bus to another can be obtained. Hence, name three parameters for which the flow of power can be controlled. Why high voltage is adopted to transmit bulk amount of power.	2 + 4 + 4
5	The typical rating for *400 kV* line conductor (ACSR Moose) is ***54/μ mm Al + 7/μ mm Steel***. What is meant by "***54/μ mm Al***" and "***7/μ mm Steel***"? Evaluate overall diameter of this conductor. Classify type-A, B, C transmission tower. What is right of way?	6 + 2 + 2
6	Why double-circuit transmission line is preferred over single-circuit line? Define string efficiency. Differentiate between flashover and puncture. For a 765 kV transmission line, how many disc insulators are required?	3 + 2 + 2 + 3
7	Draw the phasor diagram of $V_s = AV_r + BI_r$. By a suitable mathematical operation, convert this voltage equation to a power equation and hence draw the phasor diagram of the power equation. What is propagation constant?	3 + 2 + 3 + 2
8	What is power factor? What is the problem of having low power factor? Evaluate D_m where, $D_m^{AB} = D_m^{BC} = 3.7\ m$ and $D_m^{AC} = 4.9\ m$. Define surge impedance loading?	2 + 3 + 3 + 2

—— END OF QUESTION PAPER ——

B.Tech. Examination-2024
Electronics and Communication Engineering
(Odd Semester Regular & Supplementary Examination)
Microprocessor and Microcontroller (ECEUGPC10)

Time: 3.00 Hrs

F M: 80

Answer Question No. 1 and any Seven (7) Questions from 2 to 12

Q. No.		Questions	M
1.		**Answer any five questions from question No. 1**	2
	(a)	Why the lower byte address bus (A0-A7) and data bus (D0-D7) are multiplexed?	2
	(b)	Write a program to enable all interrupt except RST 5.5	2
	(c)	Draw the flag structure of 8085 microprocessor.	2
	(d)	Why program counter and stack pointer are 16 bits register of 8085 microprocessor?	2
	(e)	Write a single instruction to clear the lower four bits of the accumulator in 8085 microprocessor.	2
	(f)	Write a control word for mode 0 to configure port A and port CU as output port and port B & port CL as input port.	2
	(g)	What is subroutine?	5
2.	(a)	Draw and explain the software model of 8085 microprocessor.	5
	(b)	Explain the function of demultiplexing circuit of 8085 microprocessors.	5
3.	(a)	Explain the function of control and status signals of 8085 microprocessor.	5
	(b)	Write down the function of the instructions a) LHLD b) DAA c) STAX d) INR M e) XRA M	5
4.	(a)	Draw the timing diagram of MVI A,08 (Opcode:3E, 08) instruction stored from memory location 8000H.	5
	(b)	Interface the 2KB RAM, and 2KB EPROM memory devices in 8085 microprocessor in absolute decoding method.	5
5.	(a)	What are the interrupt pins of 8085 microprocessor? Explain briefly vector and non-vector interrupts of 8085.What is meant by priority interrupts?	5
	(b)	How does an 8085 microprocessor respond to INTR interrupt signal?	10
6.		Eight BCD numbers are stored in consecutive memory locations starting from 8500_H. Write a program to add them and store the result in 8600_H and 8601_H.	5
7.	(a)	Write down the differences between memory mapped I/O and Peripheral mapped I/O.	5
	(b)	Design a seven-segment common cathode LED output port with the device address FF_H and 8bit input port containing 8 number of switches with the device address FA_H. Write program to access the switches and display its value to LED.	5
8.	(a)	Draw and discuss the functional block diagram of 8255.	5
	(b)	Draw and explain the control word format of 8255.	5
9.	(a)	Draw and discuss in brief the BIU and EU of 8086 microprocessor.	5
	(b)	How is pipeline achieved in 8086 microprocessor?	5
10.	(a)	Explain the concept of segmented memory? What are its advantages?	5
	(b)	Explain the addressing modes of 8086 Microprocessor with proper examples.	5
11.	(a)	Draw the schematic pin diagram of the 8051 microcontroller and explain operation of the following pins: (a) RxD, (b) XTAL2, (c) $\overline{EA}$ (d) $\overline{PSEN}$	5
	(b)	Draw and explain the Program Status Word of 8051 microcontroller.	5
12.	(a)	Write down the differences between 8086 and 80286 microprocessor.	5
	(b)	Draw the architecture of ARM Processor and explain why it is a RISC Processor.	

AUTUMN SEMESTER EXAMINATION 2024

FOR BTECH (EEN) 3RD YEAR / 5TH SEMESTER

Paper: Object Oriented Programming, Paper Code: CSEUGOE03

Time: 3:00 Hours | Full Marks: 80

Section A

(Answer all questions) — 5 × 2

1. (a) Size of `int` in Java is
   A. 8 bits
   B. 16 bits
   C. 32 bits
   D. 64 bits

   (b) The built-in class `BufferedReader` is defined in the package
   A. java.io
   B. java.lang
   C. java.awt
   D. None of these

   (c) Assume that the main thread runs for 10 seconds and its 2 child threads run for 5 seconds each. What is the total execution time?
   A. 10 seconds
   B. 15 seconds
   C. 20 seconds
   D. 25 seconds

   (d) Default priority of threads is
   A. 1
   B. 2
   C. 5
   D. 10

   (e) Program statements that you want to monitor for exceptions must be contained
   A. within a `try` block
   B. within a `catch` block
   C. within a `finally` block
   D. within any arbitrary block

Section B

(Answer any 6 questions) — 6 × 5

2. What is bytecode? Is it executed or interpreted? What is the difference between interpretation and execution? — 2+1+2
3. With suitable codes, demonstrate the differences between constructor and method. — 5
4. What are the different access specifiers in Java? What happens when no access specifier is given? — 3+2
5. What is the significance of static variable and static method? How can we get the number of characters of a string? — 4+1
6. How to call superclass' constructor? What are the benefits of inheritance? — 2+3

7. Write down the differences between class and interface. What is the usefulness of interface? 3+2
8. What are the benefits of multithreading? What is meant by context switch? 3+2
9. Write down the advantages of applets. Mention the methods of the built-in `Applet` class. 3+2

Section C

(Answer any 4 questions) 4×10

10. (a) Why is the main method always pubic and static? 2+5+3
    (b) What is meant by polymorphism? Explain with examples.
    (c) Write down the merits and demerits of C++ and Java.

11. (a) What is meant by call by reference? 2+8
    (b) Write a Java program to calculate the factorial of a number.

12. (a) How can one prevent inheritance? 2+8
    (b) Write a Java program to demonstrate method overriding.

13. (a) Write a short Java program to demonstrate Divide by Zero exception. 7+3
    (b) How can a programmer throw an exception intentionally?

14. (a) How are threads created? 2+3+5
    (b) What is meant by synchronization problem? Give example.
    (c) With suitable codes, show how it is solved in Java.

15. Write short notes on 5+5
    (a) Evolution of Java
    (b) Encapsulation

ECE

Aliah University

Department of Electrical Engineering

Odd (Autumn) Semester Examination 2024 (Regular/Supplementary)

Sub: Power Electronics Devices & Converters **Code- EENUGPC17**

Full Marks: 80 Duration: 3 hrs

Instructions:

1. **Use separate answer scripts for two groups.**
2. Mention the question number clearly and write all the parts of a question at one place.
3. Write answers to the point, keeping in mind the allotted marks.
4. Draw circuit/figure & waveforms wherever applicable (including numerical).
5. Make suitable assumptions wherever necessary, symbols and notations have their usual meanings.

Group - A

Answer any Five (5 X 10 = 50 marks)

Que-1 (A) Discuss the following terms for diodes: Softness factor, PIV, reverse recovery time. **6**

(B) Explain the effect of forward bias and reverse bias on the depletion layer in p-n junction diode. **4**

Que-2 (A) The beta (β) of bipolar transistor with common emitter connection varies from 10 to 60. The load resistance Rc=5 Ω. The dc supply voltage is Vcc= 100V and the input voltage to the base circuit is V_B= 8 V. If $V_{CE(Sat)}$= 2.5 V and $V_{BE(sat)}$=1.75 V, find (a) the value of R_B that will result in saturation with an overdrive factor of 20; (b the forced β, and (c) the power loss in the transistor P_T. **6**

(B) Why is it preferable to use hard drive for BJT? **2**

(C) What is difference between β over forced β_f for BJTs? **2**

Que-3 (A) Discuss how conduction takes place in *n*- channel enhancement type PMOSFET. Draw its transfer and output characteristics. **5**

(B) A single-phase half-wave uncontrolled rectifier is connected to RL load. The supply voltage Vs=240 V at 50Hz, R=10 Ω, L=5 mH, extinction angle is 210°. Fond the average value of output voltage and output current. **5**

Que-4 Explain with the help of circuit diagram and output voltage characteristics the working of a single-phase full wave diode bridge rectifier an R- load. Draw the input/output voltages, output currents and diode voltages (use graph paper). Derive the expression of average and r.m.s. value of output voltage. **10**

Que-5 (A) Explain the working of a single-phase full-wave controlled mid-point type rectifier circuit with R-L load. Draw the output voltage, diode voltage, output current waveforms. Derive the expression of average output voltage. **7**

ECE

(B) Compare the mid-point type and bridge-type rectifier circuit. 3

Que-6 (A) What is meant by step-down chopper? Explain its operation. Sketch the input voltage, input current, output voltage and output current waveforms. State the various assumptions made. 6

(B) A step-up chopper with a pulse width of 100μs is operating from a 240V, 50Hz supply. Compute the output voltage for a chopping frequency of 2200Hz. 4

Que-7 (A) Describe the working of a half-wave phase-controlled ac voltage controller with proper circuit diagram and output waveform. Derive the rms value of the output voltage. What are the limitations of half wave ac voltage controller. 5

(B) Briefly explain the four possible configurations of single-phase ac voltage controllers. 5

Group - B
Answer any three (3 X 10 = 30 marks)

Que-7 Explain the working of a Single-Phase Half Bridge Inverter with RL-load. Derive the expression for the output voltage. 10

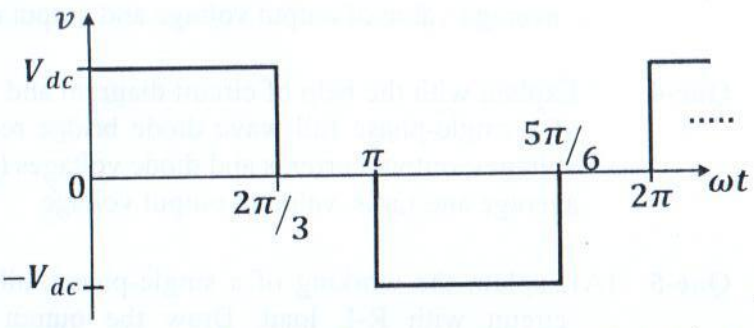
Que-8 **(A)** A single-phase multiple pulse-width modulation bridge inverter controls the power in a resistive load. This inverter is driven by a 220 V dc supply. The trigger circuit for this control consists of a comparator that is fed from a 600 Hz carrier frequency and 50 Hz reference frequency. The width of each pulse is 18^0. 5

(a) Calculate the number of pulses per half cycle and the RMS value of the output voltage.

(b) For the output voltage found in part (a), what will be maximum possible input voltage if the maximum pulse-width is given as 24^0?

(B) Draw and explain the symbol and V-I characteristics of DIAC, TRIAC and GTO. What type of applications they can be used in? 5

Que-9 For the given periodic waveform, find the THD using Fourier series expression. 10



Que-10 Draw and explain the operation table (table indicating the conducting switches, phase voltages & line voltages in each of the six modes) for a three-phase inverter in 120^0 mode of operation. Using graph paper, draw the gate currents and phase and line voltages for the said inverter. 10

Aliah University

Dept. of Electrical Engineering

B. TECH., SEM. - VII

Odd (Autumn) Semester Examination, (Regular/Supplementary), **2024**

SUBJECT NAME: **RENEWABLE ENERGY**

SUBJECT CODE: **EENUGPE14**

TOTAL MARKS: 80] **[TIME: 3 HOURS**

INSTRUCTIONS: -

1. Mention the **question number** clearly and write all the parts of a question **at one place.**
2. Write answers **to the point**, keeping in mind the allotted **marks.**
3. Draw circuit/figure & waveforms wherever applicable (including numerical).
4. Make suitable assumptions wherever necessary, **symbols and notations** have their usual meanings otherwise specified.

Answer any five

Que-1 (A) What do you understand by Commercial and Noncommercial energy? **[4]**

(B) Discuss in details about the present renewable energy scenario in India. **[8]**

(C) Explain the different environment effects of energy extraction. **[4]**

Que-2 (A) Illustrate and explain the concepts of drag and lift forces in a wind turbine, with the help of suitable diagrams. **[4+4]**

(B) Following data are given for a propeller type horizontal axis wind turbine (HAWT): **[8]**
Speed of Wind=10m/sec; Air density = 1.229 kg/m3; Rotor diameter = 120 m; Rotor speed = 40 r.p.m.; co-efficient of performance = 40%.
Calculate: (i) Total power density in wind system (ii) Total power available in the wind in kW (iii) Maximum extractable power.

Que-3 (A) Establish that the maximum output of a wind turbine can be attained when $V_d = (1/3)\ V_u$. **[8]**

(B) Sketch a neat diagram of a VAWT (Vertical Axis Wind Turbine) and explain the functions of its main components. **[8]**

Que-4 (A) What is a fuel cell, and what are its key advantages? Discuss the potential applications of fuel cells. **[2+3+3]**

(B) With the help of appropriate diagram, explain the principle of operation of Solid Oxide Fuel Cell (SOFC), along with chemical reaction involved. **[8]**

Que-6 (A) Explain the VI characteristics of a fuel cell and describe the different types of polarizations. **[5+5]**

(B) For a hydrogen-oxygen fuel cell, find the following: **[6]**

(i) Cell efficiency
(ii) Electrical work output per mole of hydrogen consumed and per mole of water produced
(iii) Heat transfer to the surroundings

The cell operates at 25°C.
Assume $\Delta H_{25^oC} = -286 \times 10^3$ KJ/ (gm mole)
And $\Delta G_{25^oC} = -237.3 \times 10^3$ KJ/ (gm mole)

Que-7 (A) Provide a comparison between floating drum and fixed dome biogas plants. **[4]**

(B) Calculate the digester volume for a cow dung-based biogas plant to meet the cooking needs of five people, where each person requires 230 liters of gas per day. Additionally, account for lighting three 100 Candle Power (CP) mantle lamps, each consuming 120 liters of gas per hour for 3 hours daily. **[12]**
Also, determine the number of cows needed to sustain the plant, assuming each cow produces 10 kg of dung per day with a collection efficiency of 70%. Assume that the dung contains 16% solids, and 340 liters of gas are produced per kilogram of solid. The slurry density is taken as 1090 kg/m³.

Que-4 (A) A PV source with IV characteristics shown in Fig. 1 is supplying power to a load, where the load line intersects the curve at (10 V, 8 A). Calculate the additional power obtained if an MPPT (Maximum Power Point Tracker) is introduced between the source and the load. **[8]**
If the MPPT costs ₹4000, determine the operational duration required to recover its cost, assuming the electricity price is ₹7.00 per kWh and the MPPT operates with 95% efficiency.

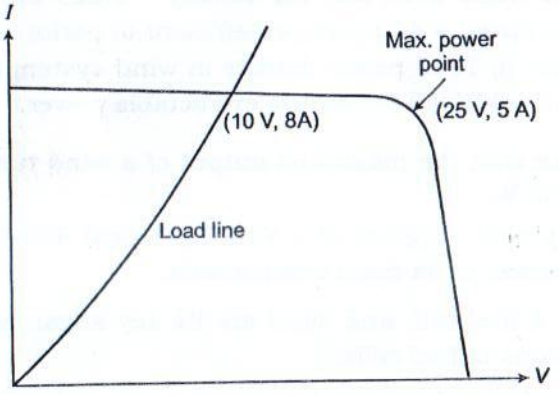


Fig. 1: PV system -load characteristics

(B) What is Maximum Power Point Tracking (MPPT)? With the aid of a suitable diagram, explain how MPPT optimizes the output of a solar photovoltaic system and ensures effective load matching. **[8]**

---------- X ----------

Aliah University

Electrical Engineering Department

Linear Programming Problem (EENUGPE19)

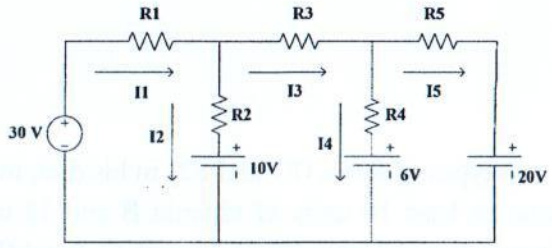
End Semester (Autumn) Examination 2024-25 (Reg/Supple)

Full Marks: 80 **Time: 3 hrs**

Instructions:

- **Use separate script for each group.**
- **Figures in the margin indicate full marks**
- **All parts of a question must be answered at the same place.**
- **Symbols have their usual meaning.**
- **Use of graph sheets for question no 2 (group-A) and no. 4 (group-B) are mandatory. For clarity, utilization of the full graph sheet is must.**

Group-A (attempt any two questions)

Ques. no	Statement of the question	Marks
1	**a)** Write the general form for the integer programming problem.	2
	b) Name the different softwares for solving a optimization problem.	2
	c) Fig. shows an electric circuit that is designed to use *30V* source to charge *10V*, *6V*, and *20V* batteries connected in parallel. Physical constraints limit the current I_1, I_2, I_3, I_4, I_5 to a maximum of *4A*, *3A*, *3A*, *2A* & *2A*, respectively. In addition, batteries must not be discharged and currents must not be negative. Formulate the optimization problem.	6
		
2	The Telfa Corporation manufactures tables and chairs. A table requires 1 hour of labour and 9 square board feet of wood, and a chair requires 1 hour of labour and 5 square board feet of wood. Currently, 6 hours of labour and 45 square board feet of wood are available. Each table contributes Rs. 800.00 to profit, and each chair contributes Rs. 500.00 to profit. Formulate and solve an IP to maximize Telfa's profit using graphical method.	10
3	**a)** Determine whether the following quadratic form is positive definite or not: $f = 2x_1^2 + 5x_2^2 + 3x_3^2 - 2x_1x_2 - 4x_2x_3, \quad x \in R^3$	5
	b) Write the steps of the Golden section search method to find the solution of an optimization problem	5

Group-B (Question no. 1 is must and attempt any four from the rest)

Ques. no	Statement of the question	Marks
1	**a)** How many basic solutions exist for a linear optimization problem with 10 variables and 6 equations?	2 x 10 = 20
	b) Can an LPP with 5 variables and 2 constraints be solved by graphical method? Justify your answer.	

c) Define basic feasible solution.

d) Why simplex method is not preferred in a LPP that contains '≥' type of constraints.

e) What are surplus variable and unrestricted variables?

f) Explain what is local optimum and global optimum.

g) Mention three main components of any optimization problem.

h) How the checking of optimality condition has been done in LPP?

i) What is the difference between linear and non-linear optimization problem?

j) Where do we encounter infeasible optimum solution? Is it accepted as a solution?

2 Solve the following equations using canonical from of realization **10**

$$X_1 + 3X_2 + 2X_3 = 6$$
$$5X_1 - X_2 + 7X_3 = 11$$
$$-X_1 - X_2 + 3X_3 = 1$$

3 a) In big-M method, why M is considered to be a large positive number? **2**

b) Solve the following problem using big-M method. **8**

Minimize $Z = x_1 + x_2$

Subject to, $x_1 + 2x_2 \geq 3$

$2x_1 + x_2 \geq 3$

$x_1 \geq 0,\ x_2 \geq 0$

4 A nutritionist wishes to mix two types of foods (F1 and F2) in his diet, in such a way that vitamin content of the mixture contains at least 10 units of vitamin B and 13 units of vitamin C. Food (F1) contains 1 unit/kg of vitamin B and 2 units/kg of vitamin C. Food (F2) contains 2 unit/kg of vitamin B and contains 1 unit/kg of vitamin C. F1 costs Rs 60/kg and F2 costs Rs 80/kg. Frame his diet plan making a linear programming problem and solve the problem by graphical method. **10**

5 Solve the following LPP using dual simplex method **10**

Minimize $Z = x_1 + 4x_2 + 3x_4$

Subject to, $x_1 + 2x_2 - x_3 + x_4 \geq 3$

$-2x_1 - x_2 + 4x_3 + x_4 \geq 2$

$x_1 \geq 0,\ x_2 \geq 0,\ x_3 \geq 0,\ x_4 \geq 0$

6 Solve the following LPP using two-phase method **10**

Minimize $Z = 4x_1 + 7x_2$

Subject to, $2x_1 + 3x_2 \geq 5$

$x_1 + 7x_2 \geq 9$

$x_1 \geq 0,\ x_2 \geq 0$

---------END OF QUESTION PAPER ---------

Odd (Autumn) Semester Examination 2025

Paper Code: MBAUGHU01; Paper name: Industrial Economics and Management

VIIth Semester (EEN/CEN/MEN/CSE)

Full Marks: 80; Time: 3Hrs.

(The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as possible)

GROUP: A (Answer *all* the questions) **(1 x 10 = 10)**

1. **I. If the quantity demanded of a commodity is unresponsive to change in prices, then the demand of that commodity is _____.**

(a) Perfectly inelastic (b) Unit elastic (c) Elastic (d) Inelastic

II. The following is (are) non-verbal communication.

(a) Facial Expression (b) Appearance (c) Posture (d) All of the above

III. The term marketing refers to_____.

(a) New product concepts and improvements
(b) Advertising and promotion activities
(c) A philosophy that stresses customer value and satisfaction
(d) Planning sales campaigns

IV. _____ is known as "the father of scientific management."

(a) Fredrick W. Taylor (b) Henry Fayol (c) Robert Owen (d) None of these

V. Which of the following could be a weakness?

(a) A developing market such as the Internet.
(b) Competitors with access to better channels of distribution.
(c) Poor quality of goods and services.
(d) Special marketing expertise

VI. Which one of the following is NOT a determinant of Supply?

(a) Input Prices (c) Demonstration Effect
(b) Policy of Taxation (d) Expectations about future prices

VII. The process of familiarizing the new employees to the organisation rules and regulations is known as_____.

(a) Placement (b) Induction (c) Recruitment (d) Selection

VIII. The competitive advantage in the production function can be achieved through_____.

(a) high wastages (b) more cost (c) higher quality (d) lowest quantity

IX. _____is about supplying customers with what they want when they want it.

(a) JUT (b) JET (c) JAT (d) JIT

X. The ultimate purpose of financial management is_____.

(a) to get a maximum return (c) to increase the wealth of owners
(b) to have a maximum risk factor (d) to get a maximum profit

GROUP: B (Answer *any five* questions) **(5 x 5 = 25)**

2. Explain the concepts of Globalization, Liberalization and Privatization.
3. Describe the various kinds of organizational communication.

4. Elaborate the importance of economics in business world.
5. Explain the functions of management.
6. What is elasticity of demand? Suppose the price elasticity of demand for a good is -0.2. If there is a 5% increase in the price of the good, by what percentage will the demand for the good go down?
7. Explain the Garvin's 8 dimensions of quality.
8. What do you mean by the term industrial relations? What are its objectives?

GROUP: C (Answer *any three* questions) **(15 x 3 = 45)**

9. (a) What is marketing mix? Describe 7P's of service marketing. (2+8)
   (b) Describe SWOT analysis with the help of an example. (5)
10. What do you mean by law of supply? What are the factors that affect supply? What are the exceptions to law of supply? (1+7+7)
11. Explain the concept of break even analysis. What are its advantages and disadvantages? (3+6+6)
12. What are the functions of material management? What are the motives of holding inventories? (10+5)
13. **Differentiate between the following terms:** **(3*5=15)**
    i. Micro Economics and Macro Economics
    ii. Maslow's need hierarchy theory and Alderfer's ERG theory
    iii. Projection and Stereotyping
    iv. Change in demand and Change in quantity demanded
    v. Formal communication and Informal communication

Aliah University
Odd Semester Examination 2025
Paper Code: MBAUGOE01
Paper name: Entrepreneurship Development
EEN/CEN/MEN 7th Semester
Full Marks: 80; Time: 3 Hrs.

(The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as possible)

Group A: (Answer any 10 of the following) **10x1 = 10**

1. Which of these is not a type of entrepreneurship?
   a. Small business entrepreneurship
   b. Scalable entrepreneurship
   c. Large scale entrepreneurship
   d. Intrapreneurship
2. Which of these actions of an entrepreneur will most likely result in creative destruction?
   a. Developing a new product
   b. Taking over a competitor's business
   c. Issuing shares to individuals and institutions
   d. Lowering prices of your product or service
3. According to Schumpeter, innovative entrepreneurs would:
   a. Thrive in the market
   b. Not survive and disappear from the market.
   c. Get absorbed within larger innovative businesses
   d. Get absorbed within non-innovative businesses
4. Which of these is not a challenge for the entrepreneur?
   a. Managing the cash flow of their business
   b. Recruiting new employees
   c. Choosing the product or service to sell in the market
   d. Formulating rules and regulations relating to conducting entrepreneurship in their country
5. Which of these theories involve taking a moderate amount of risk as a function of skill and not chance?
   a. Need for achievement
   b. Need for affiliation
   c. Need for authority
   d. Need for independence
6. Which of these is not a category of external forces that affects a business?
   a. Competitive forces
   b. Technological forces.
   c. Economic forces
   d. Socio-economic forces

7. Which among these is a money manager who is involved in making risk investments from equity capital with the objective of gaining better returns?
    a. Entrepreneur
    b. Businessperson
    c. Buyer
    d. Venture capitalist
8. Andrew Carnegie belonged to this century:
    a. 16th to 17th Century
    b. 20th to 21st Century.
    c. 17th to 18th Century
    d. 19th to 20th Century
9. Which of these is the first activity of a new business?
    a. Departure point
    b. Goal Orientation
    c. Business skill development
    d. None of the above
10. Who should be involved in preparing a firm's business plan?
    a. Accountant
    b. Engineer
    c. Entrepreneur
    d. None of the above
11. According to Clarence Danhof, …….. entrepreneurs are generally aggressive on experimentation and cleverly put attractive possibilities into practice.
    a. Innovative
    b. Adoptive
    c. Fabian
    d. Drone
12. …….. an employee within a company who develops innovative ideas and projects to help the company grow.
    a. Copreneur
    b. Intrapreneur
    c. Ultrapreneur
    d. None of the above
13. ….. entrepreneur is one who undertakes manufacturing activities.
    a. Business
    b. Trading
    c. Industrial
    d. Corporate
14. A….. entrepreneur starts and runs a number of businesses at the same time.
    a. Novice
    b. Serial
    c. Portfolio
    d. None of the above
15. …… are entrepreneurial couples who work together as co-owners of their business.
    a. Copreneur
    b. Intrapreneur

c. Ultrapreneur
d. None of the above

16. .....sector involves the direct extraction of natural resources from the Earth or the cultivation of crops and rearing of livestock.
    a. Primary
    b. Secondary
    c. Tertiary
    d. None of Above
17. ..... enterprises have an investment in plant and machinery up to ₹1 crore (approximately $120,000) and an annual turnover up to ₹5 crores (approximately $600,000).
    a. Micro
    b. Small
    c. Medium
    d. None of Above
18. ..... is a creative technique where individuals or teams generate a large number of ideas without immediately evaluating them.
    a. SWOT
    b. Brainstorming
    c. Scamper
    d. None of Above
19. .....strategy encourages entrepreneurs to create new market spaces, where there is little or no competition.
    a. Design Thinking
    b. Franchising
    c. Blue Ocean
    d. None of Above
20. ..... refers to a geographical concentration of interconnected businesses, suppliers, service providers, and associated institutions that operate in a particular industry or sector.
    a. SSI
    b. Cluster
    c. MSME
    d. None of Above

Group B (Answer any five) **5x7 = 35**

1. Who is an entrepreneur?
2. Describe the importance of innovation in Entrepreneurship.
3. Bring out the types of entrepreneur
4. What are the types of Entrepreneurs on the basis of type of business?
5. Discuss 'Project Life Cycle'?
6. State the characteristics of entrepreneurship.
7. Highlight the barriers to entrepreneurship.
8. Write a short note on 'Small Scale Industries'.
9. Discuss the problems and risks associated with 'Start-up' or Entrepreneurship.

10. What are entrepreneurial competencies?

Group C (Answer any Three) **3x15 = 45**

1. Give the characteristics of successful entrepreneurs along with their types.

Or

Prepare a detailed note on MSMEs; Importance, advantages, government support systems, clusters, and development agencies.

2. Bring out the concept of entrepreneurship. Explain the stages in entrepreneurial process in detail.

Or

Describe in detail about business Idea generation, sources, methods, and challenges with examples.

3. Explain the role of entrepreneurship in economic development. What are the barriers to entrepreneurship?

Or

Discuss about women entrepreneurship; importance, challenges, remedies, support systems and great women entrepreneurs in India.

4. Discuss the awareness, assessment and development of entrepreneurial competencies.

ALIAH UNIVERSITY
ELECTRICAL ENGINEERING
M.Tech 1st Sem
Odd (Autumn) Examination, (Reg+Sup), January, 2025
Advanced Control Engineering (EENPGPC01)

TOTAL MARKS: 80 **TIME: 3 HOURS**

INSTRUCTIONS: -
1. Mention the question number clearly. Answer all parts of a question at single location.
2. Draw circuit & waveforms wherever necessary.
3. Acronyms & symbols have their usual meaning unless otherwise specified.
4. Make suitable assumptions wherever necessary.

Que. No.	**Answer any four questions**	Marks [4x5=20]
1.a.	Is $Q(x) = 3x_1^2 + 2x_2^2 + x_3^2 + 4x_1x_2 + 4x_2x_3$ a positive definite?	[5]
1.b.	Write the advantages and disadvantages of a sampled data control system.	[5]
1.c.	Write the steps of the pole placement method of a linear time invariant (LTI) continuous time system.	[5]
1.d.	Find out the modal matrix if $A = \begin{bmatrix} 0 & 1 & 0 \\ 3 & 0 & 2 \\ -12 & -7 & -6 \end{bmatrix}$	[5]
1.e.	Write a brief note on full order observer design of an LTI system	[5]
Qu. No.	**Answer any five questions**	**Marks [5x12=60]**
2.a.	Solve the following difference equation- $x(k+2) + 5x(k+1) + 6x(k) = 0$ with $x(0) = 0$ and $x(1) = 2$.	[6]
2.b.	Give a suitable example of a state model of a single input multiple output system and show its simulation diagram.	[6]
3.a.	Derive the similarity transformation matrices in a discrete domain for any single-input single-output (SISO) system.	[6]
3.b.	State the properties of the state transition matrix for a non-homogeneous time invariant system.	[6]
4.a.	What is a model reference adaptive control? What are the advantages of this type adaptive control?	[6]
4.b,	Find out state transition matrix φ(t) for a system whose system matrix is given by $A=\begin{bmatrix} -5 & -1 \\ 3 & -1 \end{bmatrix}$ by Cayley Hamilton theorem.	[6]
5.a.	Derive the solution of a homogeneous linear time invariant state equation.	[5]

5.b. Develop a canonical form of state space model [7]

$$\frac{Y(s)}{U(s)} = \frac{3s^2 - 2}{s^3 + 15s^2 + 54s + 40}$$

6. [12]

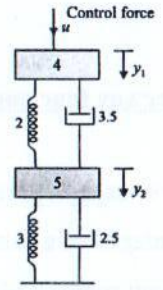


Fig. 1

Construct a state space model for the mechanical system shown in Fig. 1.

7.a. A linear dynamic time invariant system is represented by [7]

$$x(k+1) = Fx(k) + Bu(k)$$

Where,

$$F = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ 0 & -2 & -3 \end{bmatrix}; G = \begin{bmatrix} 0 & 1 \\ 0 & 0 \\ 1 & 0 \end{bmatrix}$$

Find if the system is completely controllable.

7.b. Describe an ideal sampler and its operation in discrete time control system [5]

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Aliah University

Odd (Autumn) Semester Examination, January 2025

Subject: System Identification and Estimation ; Code: EENPGPC02

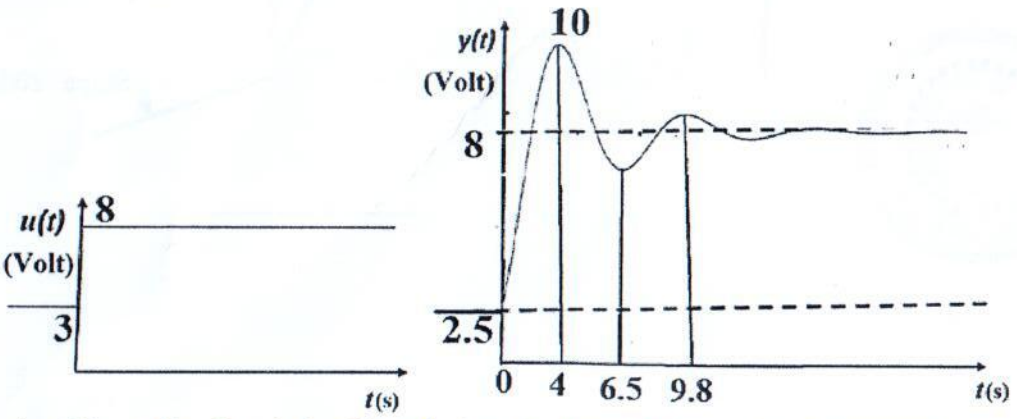
M-Tech 1st Semester Examination

TOTAL MARKS: 80 **TIME: 3 HOURS**

Answer any five questions (5×16=80)

1. (a) What do you mean by system identification? Write system identification procedure in brief. [7]
   (b) Distinguish between deterministic and stochastic systems. [2]
   (c) What do mean by analytical and identified models? [3]
   (d) Explain the different methods of system identification. [4]

2. (a) What are the different challenges associated with the closed-loop identification technique? Describe the direct method of closed-loop identification technique. [7]
   (b) The input $u(t)$ and output $y(t)$ waveforms of a system are given below. Estimate the transfer function of the system. [9]



3. (a) Derive Wiener–Hopf's relationship and show that this relationship has filter property. [8]
   (b) Explain how mathematical model can be obtained from input-output sine waves using correlation technique. [8]

4. (a) Prove that the estimated vector parameter $\boldsymbol{\theta} = (\boldsymbol{\varphi}^T\boldsymbol{\varphi})^{-1}\boldsymbol{\varphi}^T\mathbf{y}$ [where $\boldsymbol{\varphi}$ is regression vector and $\mathbf{y}$ is the output] using least-squares estimation technique. [6]
   (b) Estimate the values of the unknown parameters of the linear model $y(t) = \alpha + \beta t$ using linear regression and least-squares estimation technique. The experimental data are given in Table 1. [10]

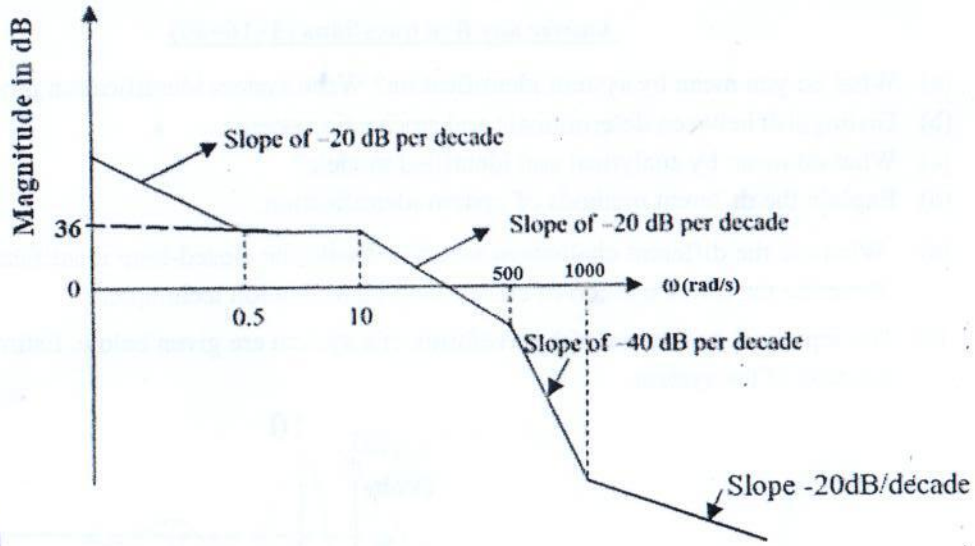
Table 1

t (s)	2	10
y (m)	5	20

5. (a) Derive the autoregressive exogenous (ARX), autoregressive moving average exogenous (ARMAX) model structures and draw their block diagrams. [6]
   (b) Explain how the parameters of autoregressive exogenous (ARX) model structure can be estimated using linear regression and least square estimation technique. [10]

6. (a) Write the differences between finite impulse response (FIR), autoregressive exogenous (ARX) model structures. [3]
   (b) What do you mean by frequency response of a system? Write the advantages of Bode plot. [3]

(b) The asymptotic Bode magnitude plot of a system is shown in the figure below. Determine the transfer function of the system. **[10]**



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Aliah University

Department of Electrical Engineering

Odd (Autumn) Semester Examination 2024 (Regular & Supplementary)

Course- M.Tech, Power System **Sem-1st**

Sub: Power Quality **Code- ENPGPC11**

Full Marks: 80 Duration: 3 hrs

Instructions:
1. Mention the question number clearly and write all the parts of a question at one place.
2. Write answers to the point, keeping in mind the allotted marks.
3. Make suitable assumptions wherever necessary, symbols and notations have their usual meanings.

Answer any five (5 X 16 = 80 marks)

1. A. Explain the following terms according to IEEE standard- (8+8)
   a. Transients b. Impulsive Transient
   c. Oscillatory Transient d. Voltage Sags
   d. Consider a field measurement when the phase-to-phase voltage phasors are $240\angle 0°, 237\angle -119°, 230\angle 115.6°$. Find out the positive sequence component, negative sequence component and % of voltage imbalance.

2. A. Differentiate between Displacement factor and True power factor. What are the advantages of improvement of power factor? (4+5+7)
   B. A 3-phase Induction motor draws 1000kVA at a p.f. of 0.8 lag. A synchronous condenser is connected in parallel to draw an additional 750kVA at 0.6 p.f. load. What is the p.f. of the total load supplied by the motor? How much reactive power is supplied by synchronous motor?

3. A. Explain the effect of harmonics in Transformer. (4+6+6)
   B. A transformer with a full load current rating of 1000A is subjected to a load with the following nonlinear characteristics. The transformer has a rated winding eddy current loss density of 15% (0.15 p.u.). Find the transformer derating factor.

Harmonic number or order (h)	Harmonic current distribution factor for harmonic h (f_h)
1	1
3	0.35
5	0.17
7	0.09

   C. Explain different types of harmonic current mitigation techniques.

4. A. Define the term IHD, THD in terms of IEEE and IEC standard. (8+8)
   B. Find the total harmonic distortion (THD) and individual harmonic distortions (IHD) of a voltage waveform with the following harmonic frequency make up: Fundamental=116 V, 3rd harmonic = 14 V, 6th harmonic = 2 V, 7th harmonic = 1.2 V, 9th harmonic = 0.9 V.

5. A. Briefly describe the High Frequency Electromagnetic Interference. (4+4+8)
   B. Define radiated emission, conducted emission.
   C. Explain different types of Electromagnetic Interference (EMI) mitigation technique.

6. A. Differentiate between grounding and bonding of an electrical installation. (2+3+6+5)
   B. List out the elements of ground electrode system as per NEC guidelines.
   C. Define the terms: Inductance grounded, Grounded effectively, Ungrounded system.
   D. Describe the earth resistance test.

7. A. Describe the function and working of the following power quality measuring devices- (8+8)
   a. Spectrum analyzers b. Flicker meters
   B. Explain high frequency interference and the health concern of Electromagnetic interference.

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Aliah University
Department of Electrical Engineering
Odd (Autumn) Semester Examination, 2024 (Regular/Supplementary)
M. Tech. 1st semester

Sub: Power System Analysis & Control **Code- EENPGPC12**
Full Marks: 80 Duration: 3 hrs

Instructions:
1. **Use separate answer scripts for the two groups.**
2. Mention the question number clearly and write all the parts of a question at one place.
3. Write answers to the point, keeping in mind the allotted marks.
4. Draw circuit/figure & waveforms wherever applicable (including numerical).
5. Make suitable assumptions wherever necessary, symbols and notations have their usual meanings.

Group-A

1. Answer Any ten questions **[10 x 2 = 20]**

i) What is the objective of power system control?
ii) What is meant by Load frequency control?
iii) What is the need for load forecasting?
iv) What is load curve & load duration curve?
v) Why that optimal power flow is combines economic dispatch with power flow?
vi) Why the real power is is generated equal to the power transferred to the infinite bus?
vii) What happens to frequency if the load on the generator increases?
viii) What are the types of automatic load frequency control for interconnected power system?
ix) What is Area control error?
x) Compare speed Governor and speed changer.
xi) What are the factors affecting the cost of generation?

2. Explain the λ-iteration method for finding the solution of economic dispatch including transmission losses with a neat flow chart. **[10]**

OR

Draw incremental fuel cost curve for a thermal plant. In a power system having two units, the loss coefficients are: **[3]+[7]**

$B_{11} = 0.0015\ MW^{-1}$, $B_{12} = -0.0006\ MW^{-1}$
$B_{21} = -0.0006\ MW^{-1}$, $B_{22} = -0.0024\ MW^{-1}$

The incremental production costs of the units are:

$$\frac{dF_1}{dG_1} = 0.08G_1 + 20 \text{ Rs/MWhr}$$

$$\frac{dF_2}{dG_2} = 0.09G_2 + 16 \text{ Rs/MWhr}$$

Find the generation schedule for $\lambda = 20$ and 25. Find also the change in transmission losses between the two schedules.

3. What are the components of speed governor system of an alternator? Derive the transfer function model of a Single area system LFC and draw its block diagram. **[10]**

OR

Draw the transfer function block diagram for a two-area system provided with governor control and obtain the steady state frequency error following a step load change in both the areas.

4. Two synchronous generators operating in parallel. Their capacities are 300 MW and 400 MW. The droop characteristics of their governor are 4% and 5% from no load to full load. Assuming that the generators are operating at 50Hz at no load, how would be al load of 600 MW shared between them. What will be the system frequency at this load? Assume free governor action. **[10]**

OR

The cost characteristics of three plants of a plant are:

$C_1 = 0.05\ P_1^2 + 17.0\ P_1 + 160$ Rs/hr

$C_2 = 0.06\ P_2^2 + 14.4\ P_2 + 200$ Rs/hr

$C_3 = 0.08\ P_3^2 + 90.0\ P_3 + 240$ Rs/hr

Where P_1 , P_2 & P_3 are in MW.

The incremental transmission losses for the network with respect to plants 1, 2 and 3 are 0.05, 0.10 and 0.15MW per MW of generation. Find the optimal dispatch for a total load of 100 MW and also its incremental cost of received power.

Group-B

(Answer any three: 3 X 10 = 30 Marks)

5. With the help of a circuit, waveform and phasor diagram, discuss the following in a power system: (a) The generation and absorption of active and reactive power (b) The relationship among active power, reactive power, voltage and load angle. **[10]**

6. Discuss the various methods adopted for the control of voltage in a power system. **[10]**

7. A 225 kV overhead line has a series resistance and inductive reactance per phase per km of 0.05 Ω and 0.061 Ω respectively. Calculate the magnitude of sending end voltage when transmitting the full line capability of 490 MW at 0.83 lagging power factor and the received voltage is 225 kV, for 85 km length of line. Find solutions by (a) accurate method, (b) neglecting δ, (c) neglecting R and (d) neglecting both δ and R. **[10]**

8. A three-phase transmission line has a resistance 6.5 Ω /phase and a reactance of 19.5 Ω /phase. (a) Determine the maximum power which may be transmitted if 232 kV were maintained at each end. (b) What is the phase difference between the receiving end and sending end voltages for maximum power transmitted? (c) Also determine the rating of a synchronous phase modifier required to supply 107 MW at 0.9 power factor lagging at the receiving end. **[10]**

ALIAH UNIVERSITY

Electrical Engineering Department

Odd (Autmn) Semester Examination 2024-25 (Reg/Supple)

Subject: Optimization Technique (EENPGPE01)

Year: 1st | Semester: I

Time: 3 hrs | Full Marks: 80

INSTRUCTIONS:

1. **Use two scripts: one for Group-A, other one for Group- B(I), B(II)**
2. Clearly mention the Question No. in the left margin of the answer sheet.
3. Write answers neatly as practicable as possible.
4. All part of a question should be answered at one place.
5. Acronyms & symbols have their usual meaning unless otherwise specified.
6. Make suitable assumptions wherever necessary.
7. **Use of graph paper is mandatory for question no. 5. For clarity, utilization of the full graph paper is must.**

Qu. No.		Marks
	Group- A (24 marks)	
	Answer any two questions (12 x 2 = 24)	
1.	a. Write the difference between local and global optimal point.	3 + 3 +
	b. Write the optimality condition for single unconstrained optimization.	2 + 4
	c. What is saddle point? Give an example.	
	d. Find out stationary points $U = x^3 + 3xy^2 - 3x^2 - 3y^2 + 7.$	
2.	a. Find out the maximum value of $U(x_1, x_2) = x_1x_2 + 2x_1$ such that $60 = 4x_1 + 2x_2$ Using substitution method.	5 + 7
	b. Write different categories of optimization techniques. Discuss any two categories.	
3.	a. Find out the maxima and minima of a function: $$f(x,y) = xy + \frac{a^3}{x} + \frac{a^3}{y}$$	12
	b. Give one example of an advanced optimization technique	
	c. Write the steps for the Lagrange multiplier method for equality constraint optimization.	
	Group - B(I) (30 marks)	
	Answer any three questions (10 x 3 = 30)	
4.	A nutritionist wishes to mix two types of foods (F1 and F2) in his diet, in such a way that vitamin content of the mixture contains at least 10 units of vitamin B and 13 units of vitamin C. Food (F1) contains 1 unit/kg of vitamin B and 2 units/kg of vitamin C. Food (F2) contains 2 unit/kg of vitamin B and contains 1 unit/kg of vitamin C. F1 costs Rs 60/kg and F2 costs Rs 80/kg. Frame his diet plan making a linear programming problem and solve the problem by regular simplex method.	10
5	Solve the following linear programming problem using the graphical method. Minimize: $Z = 5x + 4y$ such that $4x + y \geq 40$, $2x + 3y \geq 90$, $x, y \geq 0$	10
6	Solve the following LPP using dual simplex method Minimize $Z = 4x_1 + 7x_2$	10

Such that, $2x_1 + 3x_2 \geq 5$

$x_1 + 7x_2 \geq 9$

$x_1, x_2 \geq 0$

7 Solve the following LPP using two-phase method **10**

Maximize $Z = 4x + 5y$

subject to, $2x + 3y \leq 6$

$3x + y \geq 3$

$x, y \geq 0$

Group - B(II) (26 marks)
Answer any two questions (13 x 2 = 26)

8 Starting from the point (0, 0), show one iteration of the DFP method for finding the minimum point of the function: $f(x_1, x_2) = x_1 - x_2 + 5x_1x_2 + 2x_1^2 + x_2^2$ **13**

9 **(A)** Determine the nature of the matrix. **5 + 8**

$$A = \begin{bmatrix} 4 & -2 & 5 \\ 0 & 2 & -2 \\ -4 & 7 & -4 \end{bmatrix}$$

(B) Compute two iterations to minimize $f(x_1, x_2) = x_1^3 + x_2^3 + 2x_1^2 + 4x_2^2 + 6$ using Newton's method.

10 **(A)** Point out some drawbacks of Newton's method of unconstrained multi-variable optimization. **3 + 10**

(B) Starting from the point (0,0), show two steps of iteration of the steepest descent method for finding the minimum point of the function: $f(x_1, x_2) = 6x_1 - 2x_2 + x_1x_2 + 3x_1^2 + 2x_2^2$

-----END OF QUESTION PAPER -----

Aliah University

Dept. of Electrical Engineering

M. TECH. (POWER SYSTEM & CONTROL SYSTEM), **SEM. - I**

Odd (Autumn) Semester Examination, (Regular), **2024**

SUBJECT NAME: **PRINCIPLES OF INDUSTRIAL INSTRUMENTATION**

SUBJECT CODE: **EENPGPE04**

TOTAL MARKS: 80] **[TIME: 3 HOURS**

INSTRUCTIONS: -

1. Mention the **question number** clearly and write all the parts of a question **at one place.**
2. Write answers **to the point**, keeping in mind the allotted **marks.**
3. Draw circuit/figure & waveforms wherever applicable.
4. Make suitable assumptions wherever necessary, **symbols and notations** have their usual meanings otherwise specified.

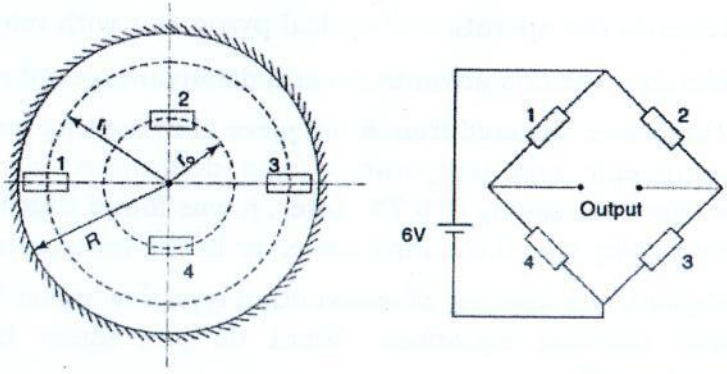
Answer any five

Que-1 (A) Explain the error distribution relating to measurement system, with the help of Gaussian law of error or normal law. **[8]**

(B) A current passing through a resistor is recorded by ten different observers and reading obtained are as 100.1A, 101.7A,100.9A,102.1A,101.5A,101A, 100A,102.1A,102.3A & 101.3 A. Calculate i) arithmetic mean ii) standard deviation and iii) variance of the readings. **[5]**

(C) Describe the limiting error with appropriate example. **[3]**

Que-2 (A) **[10]**



Above figure shows pressure transducer using a clamped diaphragm. Strain gauges 2 and 4 are meant to measure the tangential strain while gauges 1 and 3 measure the radial strain. Resistance of each gauge = 120 Ω, gauge factor=2, radius R = 7cm, r_0= 1cm and ri = 6cm. Thickness 't' of the diaphragm = 1mm. Young's module E = 2.07x 10^5 N/mm^2. Poisson's ratio υ = 0.25. Find the open circuit sensitivity in mV/Pa.

(B) What do you mean by absolute pressure and gauge pressure? Elaborate with relevant example. **[6]**

Que-3 (A) With the help of clear and labeled diagram, explain the working principle and operation of a thermal conductivity gauge or Pirani gauge. **[6]**

(B) A mercury in steel thermometer employs a Bourdon pressure gauge which has a range of 0-6 Mpa for the pointer from 0 to 270^{0}C. In the temperature calibration process the pointer movement was set to 0^0 rotation at 0^{0}C and the instrument indicate 250^0 rotation corresponding to 200^{0}C. Determine i) the sensitivity of the instrument in rad/^{0}C. ii) the error due to ambient temperature rise of 16^{0}C, if the thermometer bulb has 8 times that of combined volume of capillary and Bourdon tube iii) the error in the observed temperature values if the bulb is raised by 60 cm from calibration elevation. Take the density of mercury as 13.546 gm/ cm^3 or 13,546 kg/ m^3. **[10]**

Que-4 (A) Describe the operation of a variable area flow meter with help of proper diagram and relevant equations. **[8]**

(B) A rotameter is calibrated for metering a liquid of density 1000kg/m^3 and has a scale ranging from 1 to 100 lit/min. It is intended to use this meter for measuring the flow of gas of density 1.25 kg/m^3 with a flow range between 20 and 2000 lit/min. Determine the density of the new float, if the original one has a density of 2000 kg/m^3. The shape and volume of both floats are assumed to be the same. **[8]**

Que-5 (A) Discuss the operation of optical pyrometer with relevant sketch. **[6]**

(B) Mention various advantages and disadvantages of radiation pyrometer. **[4]**

(C) The power radiated from a hot piece of metal was measured by radiation pyrometer and temperature was determined as 820^{o}c assuming a surface emissivity of 0.75. Later, it was found that the accurate value of emissivity was 0.69. Find the error in the temperature determination. **[6]**

Que-6 (A) Explain the working of obstruction type flow meter with proper diagram and relevant equations. What do you mean by the term "*vena-contracta*"? **[6+2]**

(B) A right-angled V-notch is used to measure the discharge. Given that the head H above the sill is 0.25±0.01 m and the coefficient of discharge (Cd) is 0.6, calculate the discharge. **[8]**

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ALIAH UNIVERSITY

Odd (Autumn) Examination 2025
Elementary Arabic and Islamic Studies
Course Code: UCEPGAU01

Full Marks: 80 Time: 3:00Hrs.

ARABIC

Q. 1. Attempt any ten questions, each question carries equal marks. 2x10=20

i. Identify the letters of the following words and split them: فَسَبِّحُوه، فاستغفروه
ii. Read the following words and write the pronunciations in English: لَيُنْبَذَنَّ، فَلَنَجْزِيَنَّهُمْ
iii. Merge the following letters to make word. م+س+ت+ت+ش+ب+ش+ر+و+ن، م+س+ي+ط+ر+ي+ن
iv. Identify the following words either definite (المعرفة) or indefinite (النكرة) :
بَلَدٌ اَلشَّمْسُ، كِتَابُ خَالِدٍ ، طَعَامٌ
v. Identify the following words as they are 'Noun' (اسم) or 'Verb' (فعل) :
فِي الدارِ، لَنْ نَجْلِسَ، اَلْقَمَرُ، قَدْ فَازَ
vi. How many kinds of sentences are there in Arabic?
vii. Change the Gender of following words: مُؤمِنٌ، مُهَنْدِسةٌ، خَضْرَاءُ، مُصْلِحٌ
viii. Write any four demonstrative Pronouns (اسم الإشارة) of Arabic.
ix. How many weak letters are there in Arabic?
x. What do you Know about *Tanween*? write in short with examples.
xi. Change the Nominal sentence into verbal sentence and Verbal sentence into Nominal Sentence as well. مُحَمَّدٌ رَجَعَ مِنَ الْجَامِعَةِ شَرِبَ الْوَلَدُ مِنْ ماءِ النَّهْرِ

Q. 2. Attempt any two questions, each of them carries equal marks. 10×2=20

i. Write about parts of speech in Arabic in details by citing of examples.
ii. Write the Arabic numbers 1-20 in Arabic scripts.
iii. Write about importance of Arabic Language in Modern age.

Islamic Studies

10x4=40

Answer any four Questions:

1. Write a short note about the life of Prophet Muhammad (PBUH).
2. How Many Pillars are there in "Islam"? Write in brief.
3. What is Tawheed? Define its types with example.
4. What do You Know about Zakat? To whom Zakat is Farz? Write a short note on it.
5. How Many Pillars of Iman? Write about all of them in short.

Pedagogy Studies
Subject Code: UCEPGAU02
Semester- I
Autumn Semester Examination-2024

Time: 3 hours **Full Marks: 80**

Answer the questions in your own words. Follow the instructions & word limits while answering.
Numbers in the right-hand margin indicate marks.

1. Answer any ten questions from the following: (Word limit: 50) $2\times10 = 20$

a) Mention any two effective pedagogical practices.
b) Define Pedagogy.
c) What is meant by Peer support?
d) State any two disadvantages of teaching through the lecture method.
e) What is meant by Curriculum?
f) Mention any two roles of Guidance Material in Teacher Education.
g) What is meant by Teachers' professional development?
h) Define Heutagogy.
i) Define Educational Research.
j) Write down two characteristics of the modern curriculum.
k) What is meant by Formal education
l) Write down the concept of In-service teacher education.
m) Mention any two criteria of a good research design.
n) Mention any three professional skills of a teacher.
o) What is meant by hypothesis?

2. Answer any Eight questions from the following: (Word limit: 150) $5\times8 = 40$

a) What are the Barriers of teaching in large class sizes?
b) Differentiate between Assessment and Evaluation.
c) Mention any two Behaviourist pedagogical approaches.
d) Explain the role of community support in Education.
e) What are the benefits of Professional development and its follow-up support?
f) Discuss the differences between Pedagogy and Andragogy.
g) Write a brief note on Basic and Applied research with suitable examples.
h) Write a note on different types of learning theories.
i) What is pre-service teacher education? Mention its objectives. (2+3)
J) Why is teacher education important in the 21st century?
k) Mention the roles of a teacher to build an ideal society.

3. Answer any two questions. (Word limit: 300) $10\times2 = 20$

a) Analyse the Constructivist theory in Pedagogy.
b) Illuminate different types of evaluation with suitable examples.
c) What is meant by research? Discuss various steps of research. (3+7)

Aliah University

Dept. of Electrical Engineering

M. TECH. (POWER SYSTEM & CONTROL SYSTEM), **SEM. - III**

Odd (Autumn) Semester Examination, (Regular), **2024**

SUBJECT NAME: **SENSOR AND DEVICES**

SUBJECT CODE: **EENPGPE18**

TOTAL MARKS: 80] **[TIME: 3 HOURS**

INSTRUCTIONS: -

1. Mention the **question number** clearly and write all the parts of a question **at one place.**
2. Write answers **to the point**, keeping in mind the allotted **marks.**
3. Draw circuit/figure & waveforms wherever applicable.
4. Make suitable assumptions wherever necessary, **symbols and notations** have their usual meanings otherwise specified.

Answer any five

Que-1 (A) Outline the fundamental differences between transducers, sensors and actuators based on their definitions, functions and areas of application. Additionally, provide examples for each category to illustrate these differences. **[8]**

(B) What are the different classes of actuators? Provide a brief overview of magnetic, mechanical and soft actuators including their functions, mechanisms and applications. **[2+6]**

Que-2 (A) What do you understand by the terms scalar and vector sensors? Provide a detailed explanation of each, emphasizing their key differences, applications and how they are utilized in various sensing technologies. Explain the concept of virtual sensing and its applications in modern agriculture. **[2+4+4]**

(B) What is the purpose of an ultrasonic sensor? Explain the working of HC-SR04 ultrasonic sensor. **[2+4]**

Que-3 (A) Elaborate on what is meant by the "Things" in 'Internet of Things'? Explain the physical design of IoT by providing a detailed description along with a clear and labeled block diagram that illustrates the components and their interactions. **[3+5]**

(B) What are the various levels of IoT systems? Develop IoT Level 4 using the applicable block diagram while taking the case study of noise monitoring into consideration. **[3+5]**

Que-4 (A) What is an embedded system? Provide a detailed explanation of embedded systems, describing their key characteristics, components and how they differ from general-purpose computing systems. **[2+6]**

(B) What is cloud computing and how does it differ from traditional computing models? Discuss the various service models of cloud computing, including IaaS, PaaS, and SaaS. **[3+5]**

Que-5 (A) Discuss the integration of IoT technologies into 'Smart Grids.' Explore specific applications where IoT-based sensing and measurement technologies improve the functionality of smart grids, including real-time monitoring, demand response and grid management. **[8]**

(B) Define the role of IoT in a smart city and explain how IoT technologies improve the efficiency and performance of street lighting and smart road systems overall within these cities. **[2+6]**

Que-6 (A) Define Industry 4.0 briefly and explain how it distinguishes itself from earlier industrial revolutions. Discuss the progression and development of Industry 4.0 over time. **[4+4]**

(B) Explain the key benefits of Industry 4.0. Discuss how technologies like automation, cyber-physical systems and IoT sensors enhance production efficiency and ensure the delivery of high-quality products. **[4+4]**

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Research Methodology and IPR

Subject Code: ECEPGPR02/EENPGPR02/MENPGPR02

Semester- III

Autumn Semester Examination: 2024

Time: 3 hours **Full Marks: 80**

Answer the questions in your own words. Follow the instructions & word limits while answering. Numbers in the right-hand margin indicate marks

1. **Answer any ten questions from the following. (Word limit: 50)** **2x10=20**
   a) Write name of the main steps of research?
   b) What is IPR?
   c) What are trademarks?
   d) Mention any two roles of the review committee in assessing a research proposal?
   e) What should be included in the methodology section of a research proposal?
   f) Mention any two criteria for selecting a research Problem?
   g) What is Quantitative Research?
   h) Define the 'Research Problem'?
   i) What is meant by critical reading in literature studies?
   j) Define plagiarism in the context of academic research.
   k) What is the purpose of research ethics in academic studies?
   l) What is the difference between paraphrasing and patchwriting?
   m) Write any two differences between Quantitative and Qualitative Research?
   n) What is meant by research misconduct?
   o) What is the Patent Cooperation Treaty?
2. **Answer any eight questions from the following. (Word limit: 150)** **5x8=20**
   a) Define the instrumentations in research? Explain any one of its characteristics?
   b) Briefly state the natures of Intellectual Property?
   c) Discuss about different types of hypotheses.
   d) Discuss the role of Critical Appraisal and Meta-Analysis.
   e) Point out the differences between Population and Sample.
   f) Write the main Characteristics of a good research problem?
   g) Briefly discuss any three major research misconducts?
   h) Analyse the key differences between a literature review and literature studies.
   i) Discuss the key components of a research proposal format.
   j) Define the approach of Qualitative Research? Discuss its strength and Weakness?
   k) Analyse the significance of the international patenting system under the PCT.
3. **Answer any two questions from the following. (Word limit: 300)** **10x2=20**
   a) Discuss the different types of mention plagiarism analysis with examples of how it can be avoided in research writing. Including- 1. Direct Copying (Verbatim Plagiarism) 2. Paraphrasing 3. Patchwriting 4. Mosaic Plagiarism and 5. Self-Plagiarism.
   b) Write down briefly a research proposal on your interest area.
   c) Discuss any two tools of Data collection from the given list: 1. Interview 2. Observation 3. Rating Scale 4. Attitude scale 5. Questionnaire

Aliah University

Department of Electrical Engineering, PhD Course Work

Autumn Semester Examination, 2024-25

Subject: Research Methodology [**PHD/RM-01**]

Full Marks: 80

Time: 3 Hours

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Instructions: 1. Mention the question number clearly and write all the parts of a question at one place.

2. Make suitable assumptions wherever necessary, symbols and notations have their usual meanings.

(Short answer type question)

Answer any Ten of the followings. 2×10=20

1. a) What is research methodology?
   b) What is a research hypothesis?
   c) What is a literature review in research?
   d) What are the different types of research designs?
   e) What is a research population?
   f) What is a research instrument?
   g) What are the different types of sampling methods in research?
   h) What is a research question?
   i) Define research bias.
   j) What is Quantitative Research?
   k) What is a research validity?
   l) What is Qualitative Research?

(Long answer type question)

Answer any **Five** of the followings. **5×12=60**

1. What are the Common Problems for Research Scholars in Engineering?
2. How to write a good research paper or what are the principal component of Research paper?
3. What is "the scientific method"? Compare between Socratic Method and Scientific Method?
4. What are the format and length of a research Proposal?
5. What is the Step Guide to Developing Research Hypotheses in a Thesis? What is the methods for Testing and Validating Research Hypotheses in a Thesis?
6. Discuss the significance of literature review in research?
7. What is the difference between qualitative and quantitative research? Why choose Quantitative Research over Qualitative Research?

Aliah University

Electrical Engineering Department

Ph.D. Coursework Examination 2024-25 (Reg/ Supple)

Research & Publication Ethics (PHD/RPE-02)

FM: 40 (Reg) / 50(Supple) Times: 2 hrs

Instructions	✓ Attempt any four questions. ✓ ***For the supplementary candidate(s), attempt any five questions.*** ✓ Write your answer in simple english and as practical as possible. ✓ Different parts of the same question must be answered in one place.

Qu. No.	Statement of the question	Marks
1	Explain reference management tool. What is plagiarism? Explain the type of the plagiarism.	10
2	How to calculate H-index? What is i-10 index?	10
3	What is publication misconduct? Mention the steps to identify it. Discuss complaint and appeals in the publication process.	10
4	What is conflict of interest? Discuss its types and how they are managed?	10
5	Write a short note on "Turnitin" software.	10
6	Write a short note on "Impact factor" and "Journal Citation Report".	10