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2E3201

2E3201

B.Tech. II Sem (Main) Examination, July – 2022
2FY2-01 Engineering Mathematics - II

Time : 3 Hours   Maximum Marks : 70

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

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

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

PART - A
(Answer should be given up to 25 words only)

ALL questions are compulsory.   (10×2=20)

1. Define Beta function.

2. What is the value of $\int_0^\infty e^{-x^2} dx$?

3. Define sequence with examples.

4. Test the convergence of $\sum_{n=1}^{\infty} \frac{n}{n+1}$.

5. Define even and odd functions with suitable examples.

6. What is the value of Fourier Coefficient bn of the function $f(x) = x^2$ in $(0, 2\pi)$?

7. Find the Jacobian $\frac{\partial(u,v)}{\partial(x,y)}$, where $u = e^x \sin y$ and $v = x + \log \sin y$.

8. What is the maximum value of the function $f(x) = xe^{-x}$ in the interval $(0, \infty)$?

9. Define Green's Theorem in the plane.

10. If $\vec{v} = x^2 zi - 2y^3 z^2 j + xy^2 z \hat{k}$, find curl $\vec{v}$ at $(1, -1, 1)$.

2E3201/2022   (1)   [Contd....

PART - B

(Analytical/Problem solving questions)

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

1. Prove that $\int_0^1 e^{-ax} x^{n-1} dx = \dfrac{\sqrt{(n)}}{a^n}$.

2. Show that the series $1 + \dfrac{x}{1!}(\log a) + \dfrac{x^2}{2!}(\log a)^2 + \dfrac{x^3}{3!}(\log a)^3 + \dots$ is convergent.

3. Find the Fourier half range sine series for e^x in $0 < x < 1$.

4. Discuss the extreme values (maxima and minima) of the function $x^3 + y^3 - 3axy$.

5. Evaluate $\int_0^\infty \int_0^\infty e^{-(x^2+y2)} dx\, dy$.

6. Show that the ratio test fails for the series $\sum_{n=1}^{\infty} \dfrac{1}{n^3}$, although it is convergent.

7. Evaluate the integral $\int\int_D x^4 y^3 \, dx\, dy$ where D is the region bounded by $x = 0, y = 0$ and $\dfrac{x^3}{a} + \dfrac{y^3}{b} = 1$.

PART - C

(Descriptive/Analytical/Problem Solving/Design question)

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

1. Evaluate

   a) $\int_0^\infty \dfrac{x^8(1-x^6)}{(1+x)^{24}} dx$

   b) $\int_0^\infty \dfrac{x^4(1-x^5)}{(1+x)^{15}} dx$

2. Test the convergence of series $\left(\dfrac{2^2}{1^2} - \dfrac{2}{1}\right)^{-1} + \left(\dfrac{3^3}{2^3} - \dfrac{3}{2}\right)^{-2} + \left(\dfrac{4^4}{3^4} - \dfrac{4}{3}\right)^{-3} + \dots$.

3. Find the Fourier series for the function $(x + x^2)$ in the interval $-\pi < x < \pi$. Hence, show that $\dfrac{\pi^2}{6} = \dfrac{1}{1^2} + \dfrac{1}{2^2} + \dfrac{1}{3^2} + \dots$.

4. a) Find the directional derivative of $f(x, y) = x^2 y^3 + xy$ at $(2, 1)$ in the direction of a unit vector which makes an angle of $60°$ with the x-axis.
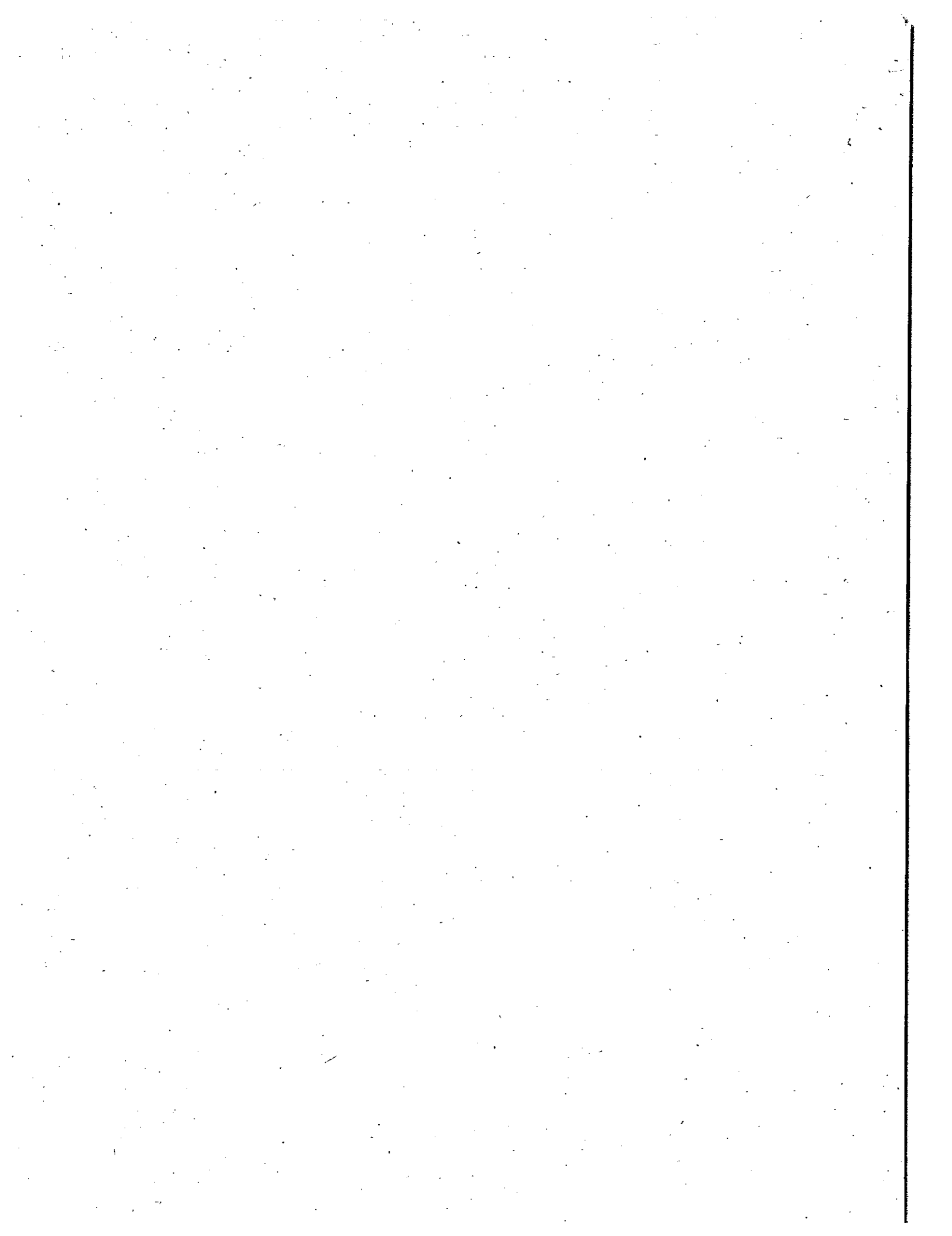
   b) Prove that $\text{div}\left(r^n \vec{r}\right) = (n+3)\vec{r}^n$.

5. a) Show that the integral $\iiint x^{l-1} y^{m-1} z^{n-1}\, dx\, dy\, dz$ integrated over the region in the first octant below the surface

   $$\left(\dfrac{x}{a}\right)^p + \left(\dfrac{y}{b}\right)^q + \left(\dfrac{z}{c}\right)^r = 1 \text{ is}$$

   $$\dfrac{a^l b^m c^n}{pqr} \dfrac{\left|\dfrac{l}{p}\right| \left|\dfrac{m}{q}\right| \left|\dfrac{n}{r}\right|}{\left|\left(\dfrac{l}{p} + \dfrac{m}{q} + \dfrac{n}{r} + 1\right)\right|}.$$

   b) Verify Green's theorem in the plane for $\oint\limits_{c} (xy + y^2)dx + x^2 dy$ where C is closed curve of the region bounded by $y = x$ and $y = x^2$.

   _____

Time: 3 Hours

Maximum Marks: 70

Part-A (All Ten Questions)

Q.1 Let v_1, v_2 and v_3 be the first, second and third column vectors, respectively, of the matrix

$$A = \begin{pmatrix} 2 & 1 & 7 \\ 1 & 0 & 2 \\ -1 & 5 & 13 \end{pmatrix}.$$

What can we conclude about rank(A) from the observation $2v_1 + 3v_2 - v_3 = 0$?.

Q.2 Suppose the system $AX = B$ is consistent and A is a 5×8 matrix and rank(A) = 3. How many parameters does the solution of the system have ?.

Q.3 State Cayley-Hamilton Theorem.

Q.4 Write the non-linear first order Bernoulli equation.

Q.5 Define Exact first order differential equation.

Q.6 Write the Euler-Cauchy differential equation.

Q.7 Write Clairaut's type differential equation.

Q.8 Write Bessel's differential eqiation.

Q.9 Write the Charpit's equations for the first order partial differential equation $f(x, y, z, p, q) = 0$.

Q.10 Classify the partial differential equation $\dfrac{\partial^2 u}{\partial x^2} + 3\dfrac{\partial^2 u}{\partial x \partial y} + \dfrac{\partial^2 u}{\partial y^2} = 0$.

$$10 \times 2 = 20$$

Part-B (All Five Questions)

Q.1 Find the values of λ for which the equations

$$
\begin{aligned}
(\lambda - 1)x + (3\lambda + 1)y + 2\lambda z &= 0 \\
(\lambda - 1)x + (4\lambda - 2)y + (\lambda + 3)z &= 0 \\
2x + (3\lambda + 1)y + 3(\lambda - 1)z &= 0
\end{aligned}
$$

are consistent.

Q.2 Solve the differential equation

$$(2y^3xe^y + y^2 + y)dx + (y^3x^2e^y - xy - 2x)dy = 0.$$

Q.3 Solve: $y = 2px + yp^2$; where $p = \dfrac{dy}{dx}$.

Q.4 Solve: $(D^2 - 4D + 13)y = 18e^{2x}\sin 3x$; where $D \equiv \dfrac{d}{dx}$.

Q.5 Find the general solution of the partial differential equation

$$(3 - 2yz)p + x(2z - 1)q = 2x(y - 3); \text{ where } p = \frac{\partial z}{\partial x}, q = \frac{\partial z}{\partial y}.$$

$$5 \times 4 = 20$$

Part-C (Any Three Questions)

Q.1 Examine whether the matrix

$$A = \begin{pmatrix} -2 & 2 & -3 \\ 2 & 1 & -6 \\ -1 & -2 & 0 \end{pmatrix}$$

is diagonalizable. If so, obtain the matrix P such that $P^{-1}AP$ is a diagonal matrix.

Q.2 Find the general solution of the differential equation

$$(D^2 + 4D + 4)y = e^{-2x}\sin x, \ D \equiv \frac{d}{dx}$$

using the method of variation of parameters.

Q.3 Find the power series solution of $(1 - x^2)\dfrac{d^2y}{dx^2} - 2x\dfrac{dy}{dx} + 2y = 0$ about $x = 0$.

Q.4 Find the complete integral of the partial differential equation

$$p^2q^2 = 9p^2y^2(x^2 + y^2) - 9x^2y^2.$$

Q.5 Solve the following equation $\dfrac{\partial^2 z}{\partial x^2} - 2\dfrac{\partial z}{\partial x} + \dfrac{\partial z}{\partial y} = 0$ by the method of separation of variables.

$$3 \times 10 = 30$$

2E3202

2E3202

B.Tech. II Sem (Main) Examination, July - 2022
2FY2-03/Engineering Chemistry

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

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

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

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

PART - A

(Answer should be given up to 25 words only)

ALL questions are compulsory.   (10×2=20)

1. What is the cause of hardness of water?   (2)
2. How silica can be removed from water?   (2)
3. What are the units of hardness?   (2)
4. Name any two primary solid fuels.   (2)
5. What is octane rating for petrol?   (2)
6. What are the consequences of corrosion?   (2)
7. Define annealing of glass.   (2)
8. What are clinkers?   (2)
9. What are Electrophilic reagents?   (2)
10. Define flash point and fire point.   (2)

PART - B

(Analytical/Problem solving questions)

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

1. With the help of a neat diagram, describe fractional distillation of crude petroleum and name the various products obtained.   (4)
2. What is priming and foaming? Discuss their disadvantages.   (2+2=4)

3. What is break point chlorination. Explain with suitable diagram. (4)

4. Discuss the following in brief. (2+2=4)
   a) Borosilicate glass
   b) Optical glass

5. Explain setting and hardening of cement. (4)

6. Write short notes on: (2+2=4)
   a) Cloud Point and Pour Point
   b) Viscosity and viscosity Index.

7. Discuss the mechanism of dry corrosion. (4)

PART - C

(Descriptive/Analytical/Problem Solving/Design question)

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

1. Calculate the amount of lime (84% pure) and soda (92% pure) required for treatment of 20,000 litres of water, whose analysis is as follows:

   $Ca(HCO_3)_2$ = 40.5 ppm; $Mg(HCO_3)_2$ = 36.5 ppm; $MgSO_4$ = 30.0 ppm; $CaSo_4$ = 34.0 ppm; $CaCl_2$ = 27.75 ppm, and Nacl = 10.00 ppm. (10)

2. A sample of coal was found to contain C = 92%, H = 5% and Ash = 3%. When this coal was tested in laboratory for its calorific value in Bomb calorimeter, following data were obtained:

Weight of coal burnt	=	0.95 g
Weight of water taken	=	700 g
Water equivalent of bomb and calorimeter	=	2,000 g
Rise in temperature	=	2.48 °C
Cooling correction	=	0.02 °C
Fuse wire correction	=	10.0 Cal
Acid correction	=	60.0 Cal

   Calculate the net and gross calorific values of the coal in cal/g. Assume the latent heat of condensation of steam as 580 cal/g. (10)

3. How would you determine the calorific value of coal by Bomb calorimeter? Explain with the help of a neat diagram. (10)

4. How is water softened by lime-soda process? Describe with suitable diagrams and chemical reactions. (10)

5. Describe the synthesis, properties and uses of paracetamol. (10)

2E3202 (2)

| 2E3203 |

B.Tech. II Sem. (Main) Examination, July - 2022
2FY2-02 Engineering Physics

Time : 3 Hours   Maximum Marks : 70

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

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

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

PART - A
(Answer should be given up to 25 words only)

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

1. What will happen if we use a lens (Newton's Ring) of small radius of curvature?

2. What do you mean by "Q" factor for light?

3. State Rayleigh's criterion of resolution.

4. What is the physical interpretation of wave-function?

5. Define spatial and temporal coherence.

6. Write threshold conditions for laser action.

7. What is the difference between spontaneous and stimulated emission.

8. State Faraday's Law and Bio-Savart Law.

9. What do you mean by Maxwell's equations?

10. What do mean by covalent and metallic bonding.

(Analytical/Problem solving questions)

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

1. What is Numerical Aperture (NA) of an optical fibre? What does the numerical aperture signify?

2. Calculate the conductivity of the intrinsic germanium at 300 K. Given $n_i = 2.4 \times 10^{19}/m^3$, $\mu_e = 0.39\ m^2V^{-1}s^{-1}$ and $\mu_p = 0.19\ m^2V^{-1}s^{-1}$.

3. An electron is confined to a one dimensional box of side 1 A°. Obtain the first four eigenvalue of the electron in eV.

4. A diffraction grating just resolves lines 4547.27 A° and 4547.98 A° in third order. Will it resolve lines 6437.48 A° and 6437.95 A° in the first order?

5. Give the construction and working of semiconductor laser. Draw necessary energy level diagrams.

6. In an He-Ne laser system, the two energy levels of Ne involved in lasing action have energy value of 20.66eV and 18.76eV. Population inversion occurs between these two levels. What will be the wave length of a laser beam produced?

7. Explain fermi-Dirac distribution function and fermi energy.

PART - C
(Descriptive/Analytical/Problem Solving/Design questions)

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

1. A plane transmission grating produces and angular separation of 0.01 radian between two wavelengths observed at an angle of 30°. If the mean value of the wavelength is 5000A° and the spectrum is observed in the second order, calculate the difference in the two wavelengths.

2. The spectral spread of red cadmium light of wavelength 694.3 nm is 0.001 mm. Calculate spectral purity factor, coherence length and coherence time.

3. Show that the Hall coefficient is independent of the applied magnetic field and is inversely proportional to the current density and electronic charge. Mention the application of Hall Effect.

4. State and prove pointing theorem for the rate of flow of energy in electromagnetic field. What is pointing vector?

5. Prove that in high frequency region Laser action is not possible.

2E3204

2E3204

B.Tech. II Sem (Main) Examination, July - 2022
2FY1-05 Human Values

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

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

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

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

PART - A
(Answer should be given up to 25 words only)

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

1. What do you understand by 'Natural Acceptance'?

2. Define 'Prosperity'.

3. Explain 'Sukh'.

4. Explain the material Body.

5. Give meaning of vishwas.

6. Define 'Nyaya'.

7. What is 'Recyclability'?

8. What do you understand by 'Self regulation in Nature?

9. Explain 'Professional Ethics'.

10. Define 'Humanistic Education'.

PART - B
(Analytical/Problem solving questions)

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

1. Explain the process of 'Self exploration'.

2. Discuss the needs of Self 'I'.

3. State the differences between Intention and competence.

4. Write a short note on 'Ubhay-tripti'.

5. Explain the significance of 'Sah-astitva' of mutually interacting units in all pervasive space.

6. Discuss the role of the professional competence for augmenting universal human order.

7. Explain the significance of ethical human conduct in a profession.

PART - C
(Descriptive/Analytical/Problem Solving/Design questions)

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

1. Discuss the methods to fulfill different human aspirations.

2. Explain 'Harmony in Myself'. Discuss 'Sanyam' and 'Swasthya' with their role in keeping harmony between self and body.

3. Discuss the concept of 'Undivided Society'. Explain the major values in human-human relationships.

4. Discuss in details the interconnectedness of the four orders of Nature.

5. Describe the significance of Profession Ethics in identifying the characteristics of Eco-friendly production systems and technologies. Give strategies for transition from the present state to the state of universal human order.

2E3205

B.Tech. II Sem (Main) Examination, July - 2022
2FY1-04 Communication Skills

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

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

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

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

PART - A
(Answer should be given up to 25 words only)

ALL questions are compulsory.   (10×2=20)

1. Define the term communication.

2. Write any two barriers of communication.

3. How interpersonal communication can be improved?

4. Change the sentence into passive voice:

   a) Shut the window

   b) Don't tell a lie

5. Fill in the blanks with suitable models:

   a) _____ I borrow your rain coat, please?

   b) You ought to buy now, the prices _____ go up.

6. Write the name of author "The night train at Deoli".

7. Write the essence of the poem "No Men are Foreign". (Within 25 words).

8. Fill in the words with suitable linking words.

   a) John bought the watch, _____ it was expensive.

   b) _____ the fact that it wasn't easy, I finished the homework.

9. Complete the statements with suitable conditional words;

   a) If I had known, I _____

      i) Will help

      ii) Would help

      iii) Would have helped

   b) Millions of people will die if they _____ aid soon.

      i) don't receive

      ii) Won't receive

      iii) Wouldn't receive

10. " How much Land Does a Man need?" Who is author of this story and write in brief the outcome of story.

PART - B
(Analytical/Problem solving questions)

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

1. Discuss the meaning of communication. Draw the chart of communication process and explain each & step.

2. Draft a letter of complaint to the Sales Manager of a Manufacturing company who has sent you some defective and worthless electric items in response to your order placed last month.

3. Discuss the summary of story "Luncheon". What makes the narrator's lady friend remark - 'you are quite a humorist'?

4. "Where knowledge is free

   Where the world has not been

   Broken up into fragments

   By narrow domestic walls".

   Write the context, Explanation and Reference of these lines.

5. "Whenever me are told to hate our brothers". When do you think this happen? Why? Should we do as we are told at such times what does the poet say? Write the answers of this questions in brief discuss the essence of poem.

6. Write a paragraph of about 100-120 words on any one of the following.
   a) Ragging in professional institutions.
   b) A visit a museum.
   c) Environmental Scanning for corporate strategy.

7. a) List out any four qualities needed for good communication. Explain in brief of any two qualities.
   b) Write two physical barrier, of Listening and speaking.

PART - C

(Descriptive/Analytical/Problem Solving/Design question)

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

1. a) Differentiate between formal and Informal channels of Communication.

   b) Elaborate the types of Communication.

2. What is meant by Human Communication and discuss the methods to improve interpersonal communication.

3. Prepare your Curriculum-Vitae with an application for the post of programmer after seeing an advertising in the times of India dated 23 March 2021.

4. Recently your college held a seminar conservation of electricity and natural resources as a part of 'earth day'. Write a report in 100-125 words which covers concept with significance of report. Sign as Sandeep (Delhi 2021).

5. Define the summary of the poem "If" by Rudyard Kipling. What does the poem teacher us? Write all the suggestions given by poet in his creation "If".

_____
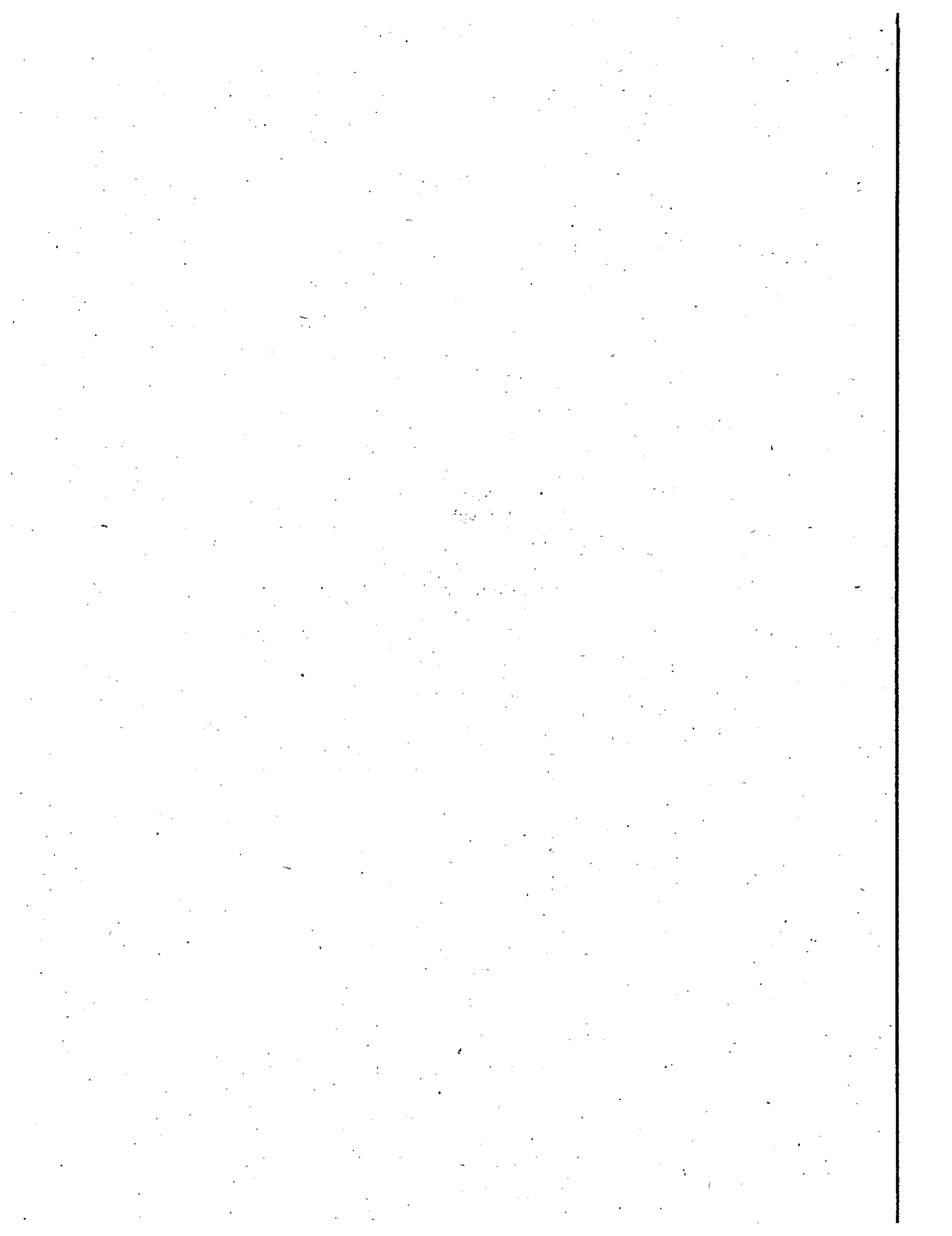
2E3206

B.Tech. II Sem (Main) Examination, July - 2022
2FY3-07 Basic Mechanical Engineering

Time : 3 Hours   Maximum Marks : 70

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

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

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

PART - A
(Answer should be given up to 25 words only)

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

1. What is industrial engineering? Write its scope.   (2)

2. Explain the adiabatic system with suitable example.   (2)

3. Describe Zeroth law of thermodynamics.   (2)

4. Define steam boiler and write different types of boiler.   (2)

5. Define blade velocity coefficient.   (2)

6. Define toughness and brittleness.   (2)

7. What do you understand by chamfering and Baring.   (2)

8. What is pattern in casting process?   (2)

9. What are different types of belt drives?   (2)

10. What is the difference between efficiency and Co-efficient of performance.   (2)

PART - B

(Analytical/Problem solving questions)

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

1. Why cooling of I.C. Engines required? Describe briefly any one cooling method used in I.C. Engines. (4)

2. Write short note on comfort air conditioning. (4)

3. The distance between two bearing of a shaft which transmits 200 h.p. at 250 rpm is 250 cm. It is subjected to torsion only. Determine the diameter of the shaft for steady loading if the safe shear stress is 400 kg/cm². (4)

4. Derive an expression for the length of open belt drive. (4)

5. Differentiate between welding, braning and soldering processes. (4)

6. What is metal casting? Describe different methods of metal casting. (4)

7. Explain the various engineering materials properties. (4)

PART - C

(Descriptive/Analytical/Problem Solving/Design questions)

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

1. An engine, based on air standard Otto cycle, is supplied with air at 0.1 Mpa and 35° C. The compression ratio is 8. The heat supplied is 500 KJ/kg. for given working air specific heat capacity at constant pressure and at constant volume is 1.005 KJ/kgk, 0.718 KJ/kgk respectively find the following. (10)

   a) Efficiency of an engine

   b) Temperature and pressure at the end of compression

   c) Maximum temperature of the cycle.

2. What is meant by refrigeration system? Describe vapor compression refrigeration system with suitable diagram. (10)

3. Explain in detail, the various operations of drilling machine with diagrams. (10)

4. Explain the various stages of heat treatment process. (10)

5. A belt is running over a pulley of diameter 100 cm at 300 rpm. The angle of contact is 150° and coefficient of friction between the belt and pulley is 0.3. If the maximum tension in the belt is 3000 N, find the power transmitted by the belt. (10)

1E2409

1E2409

B.Tech. I Sem. (Reback) Examination, April/May - 2022
ESC
1FY3-09 Basic Civil Engineering

Time : 2 Hours

Maximum Marks : 80
Min. Passing Marks : 28

Instructions to Candidates:

Attempt all five questions From Part A, four Questions out six questions from Part B and two questions out of three from Part C .

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

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

PART - A

(Answers should be given up to 25 words only)

All question are compulsory. (5×2=10)

1. Define rainwater harvesting. (2)

2. Differentiate between prismatic and surveyor's compass. (2)

3. Define levelling and objects of levelling. (2)

4. Describe transportation and its various modes. (2)

5. Define watershed. (2)

PART - B

(Analytical/Problem solving questions)

Attempt any four questions: (4×10=40)

1. List out the sub branches of civil Engineering. (10)

2. Discuss the objects of surveying. (10)

3. Write down the various tape correction applied in linear measurement. (10)

4. Write short notes on the following. (2.5×4=10)

i) Bearing   ii) Representative fraction(R.F).

iii) Reduced level   iv) Fore and back Bearing.

5. Describe impact of infrastructural development on economy of country and role of Civil Engineer in society. (10)

6. Explain in details various causes of accidents and road safety measures. (10)

PART - C

(Descriptive/Analytical/Problem solving/Design Question)

Attempt any two questions. (2×15=30)

1. a) Explain the importance of a Civil Engineer in society. (5)

    b) The following readings are taken with the help of a leveling instrument; 0.775, 1.505, 1.225, 1.445, 1.775, 1.005, 1.695, 0.835, 1.445, 1.215, 2.110, 1.950, and 1.735. Instrument is shifted after third, fifth, seventh and eleventh reading. Enter the above reading in a level field book and compute the reduced level of all stations using rise and fall method. The first reading was taken when a staff was held at a benchmark of 77.855m (10)

2. a) Explain Hydrological cycle with neat sketch. (5)

    b) Write short notes on the following. (2.5×4=10)

      i) Expalin W.C.B and Q.B.

      ii) Define plan and geodetic surveying.

      iii) Define latitude and departure.

      iv) Explain plinth area.

3. a) Convert the following bearings Q.B to W.C.B or W.C.B to Q.B. (5)

    b) Define total station? Expalin the working of a total station. (10)

2E3209

B.Tech. II Sem (Main) Examination, July - 2022
2FY3-08 Basic Electrical Engineering

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

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

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

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

PART - A
(Answer should be given up to 25 words only)

ALL questions are compulsory.   (10×2=20)

1. How is the Norton's theorem similar to Thevenin's theorem? In what respect do they differ?   (2)

2. What is function of commutator and brushes?   (2)

3. Find the relationship between phase and line voltage and currents for delta and star connected system.   (2)

4. What is significance of the form factor and peak factor?   (2)

5. Give the comparision between squirrel cage induction motor and slip ring induction motor.   (2)

6. Why the stator windings of alternator are generally star-connected?   (2)

7. Why three - phase synchronous motor will always run at synchronous speed? (2)

8. What are the values of the power - factor for following circuits-   (2)

   a) Pure inductive circuit and

   b) Pure resistive circuit?

9. Why transistor is called current controlled device? What is need of biasing the transistor?   (2)

10. Give the comparision between different voltage source and between different types of current source.   (2)
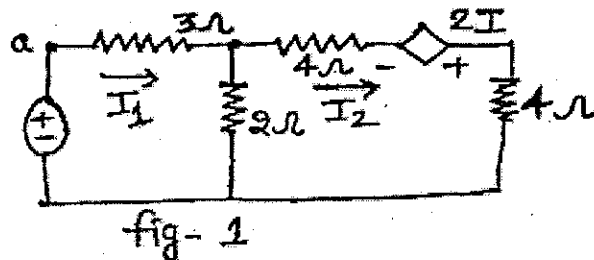
PART - B

(Analytical/Problem solving questions)

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

1. Find the current in branches of fig-1 using node voltage method. (4)

fig- 1

2. Determine the resonant frequency in an series R-L-C circuit. Determine current, power factor at resonance condition. (4)

3. A 3-phase induction motor is wound for 4-poles and is supplied from a 50Hg system. Find

   a) Actual speed of the motor when running at 4% slip and

   b) Frequency of emf induced in rotor. (4)

4. Find R to have maximum power transfer in circuit of Fig. 2. Also find maximum power transferred. (4)

fig-2
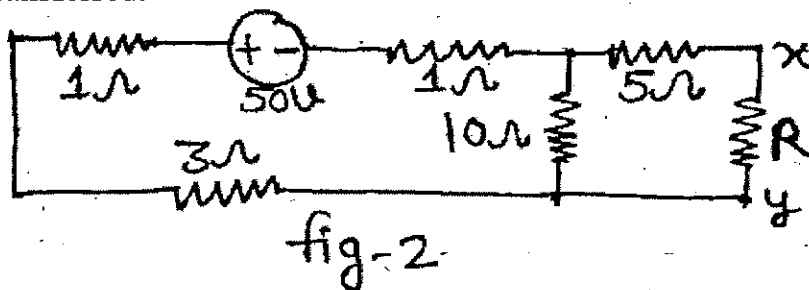
5. Derive the emf. equation of a single phase transformer Draw phasor diagram of ideal transformer under. (4)

   a) Unity power factor

   b) Lagging and

   c) Leading power factor.

6. Draw the V-I characteristics of SCR. And mark all important points on characteristics and define them. (4)

7. Classify different types of 1-phase rectifier with R-Load. Draw equivalent circuit diagram of each type. Also sketch input, output voltage waveform and current waveform with proper labeling. (4)

PART - C

(Descriptive/Analytical/Problem Solving/Design question)

Attempt any **Three** questions: $(3\times10=30)$

1. Give the comparision between switch fuse unit, MCB, ELCB, MCCB. Discuss need of earthing. Explain different types of earthing with suitable circuit diagram.**(10)**

2. Sketch a layout of squirrel cage induction motor and label all the parts. Explain working principle of 3-phase induction motor and draw equivalent circuit diagram. **(10)**

3. Explain working principle of transformer. Classify different types of losses occur in transformer. Deduce relationship between losses for maximum efficiency. **(10)**

4. Prove that is a D.C. current of I amp is super imposed on an AC current of peak value I amp, the rms value of the resultant current is $\sqrt{3/2}$ I. **(10)**

5. Find the current through 3Ω resistance of circuit shown in fig. 3 using Norton's Theorem, verify the result using Thenenin's theorem. **(10)**
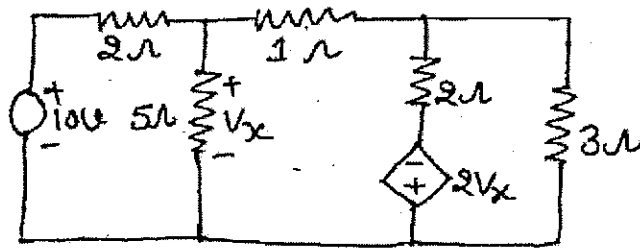

fig-3