

Uka Tarsadia University
CGPIT & Diwaliba Polytechnic



Diploma
Semester – 1/2
Engineering Physics

(ME/ EE/ Civil/ CE / Chemical)
(020020104 /020010104/020040203/ 020030203/ 020050203)

EFFECTIVE FROM July-2016

Question Bank

Q:1(A) – (1 Marks)

1) Define scalar and vector quantity.

Ans – Those physical quantities which have possess only magnitude and no direction called Scalar quantity.

e.g. : mass , time , volume

- Those physical quantity which have magnitude and direction both are called vector quantity.

e.g. : velocity , acceleration , force

Ans- (group-2 by S. S. Patel) pg. no -2

2) What do you mean least count?

Ans – the smallest fraction of the unit of length which can be measured with Vernier caliper is called least count.

Ans- (group-2 by S. S. Patel) pg.no -7

3) Give formula for least count of a Vernier calipers.

Ans- (group-2 by S. S. Patel) pg.no - 11

4) Give formula for least count of a Micrometer.

Ans- (group-2 by S. S. Patel) pg.no - 11

5) What do you mean zero error?

Ans- (group-2 by S. S. Patel) pg.no -7,11

6) Write two rule for determining the significant figure.

Ans- (group-2 by S. S. Patel) pg.no -18

7) Define : physical quantity with proper examples

Ans – A quantity which is measurable, and understandable but not observable or touchable is called physical quantity.

e.g. : length , mass ,time. Etc....

Ans- (group-2 by S. S. Patel) pg.no – 1

8) Define derivative quantities with proper examples

Ans – The physical quantities which depend upon the fundamental quantities for their measurable are derived quantities.

e.g. – speed, density etc.

Ans- (group-2 by S. S. Patel) pg.no - 4

9) $1 \text{ A}^0 = \dots 10^{-10} \dots \text{m}$

10) $1 \text{ dyne} = \dots 10^{-5} \dots \text{N}$

11) Rounding off 18.854 up to three significant figure is...18.9.....

12) ----- is a vector quantity. (a) speed (b) velocity (c) time

13) Define: Basic physical quantities (Fundamental Physical quantities)

Ans – Physical quantities which not depend upon any other quantities of

measurement are called Basic physical quantities (Fundamental Physical quantities)

Ans- (group-2 by S. S. Patel) pg.no – 3

14) 1 nm =m

Q:1(B) – (2 Mark)

1) Define below quantity.

a) Ampere b) second c) kilogram d) Kelvin e) meter f) candela

Ans- (group-2 by S. S. Patel) pg.no -3,4

2) Write the rules which followed in S.I unit system.

Ans- (group-2 by S. S. Patel) pg.no - 5

3) Show significant figure

a) 12398 b) 12.001 c) 0000.01 d) 1010.01 e) 0.00003 f) 3.5317 g) 3000

Ans- (group-2 by S. S. Patel) pg.no - 26

4) Draw and explain positive and negative error of Vernier Calipers.

Ans- (group-2 by S. S. Patel) pg.no – 7,8

5) Draw and explain positive and negative error of Micrometer Screw Gauge.

Ans- (group-2 by S. S. Patel) pg.no - 10

6) Define unit? Give properties of unit?

Ans- (group-2 by S. S. Patel) pg.no -2

7) Enlist Difference between scalar and vector quantity.

Ans- (group-2 by S. S. Patel) pg.no - 2

8) Give the difference between accuracy and precision.

Ans- (group-2 by S. S. Patel) pg.no – 11,12

9) Pitch of the micrometer screw is 1/2mm. if its circular scale is divided in equal 50 division, calculate L.C.

Ans- (group-2 by S. S. Patel) pg.no -20

10) If 50 division of vernier scale are equal to 49 division of main scale.

Calculate least count of vernier caliper. Main scale in millimeter

Ans- (group-2 by S. S. Patel) pg.no -23

11) Main scale of a Vernier caliper is calibrated in millimeter. 100 divisions of Vernier scale is equal to 25 division. Calculate Least count of it.

12) Main scale of a Vernier caliper is calibrated in millimeter. Twenty divisions of Vernier scale is equal to 19 division. Calculate Least count of it.

13) In a vernier calipers 24 divisions of it's main scale are equavelent to 25 divisions of it's vernier scale. Calculate it's least count if it's main scale is calibrated in mm.

14) Give a small difference between micrometer screw and vernier caliper.

Ans- (group-2 by S. S. Patel) pg.no -6 to 11

(2)

1) Write short notes on Vernier calipers.

Ans- (group-2 by S. S. Patel) pg.no -6,7,8

2) Write short notes on micrometer screw.

Ans- (group-2 by S. S. Patel) pg.no – 9,10,11

3) How many types of errors? And explain its all type.

Ans- (group-2 by S. S. Patel) pg.no - 13

4) Write the basic physical quantities in SI with units and symbols.

Ans- (group-2 by S. S. Patel) pg.no -3

5) Calculate the diameter and volume of a sphere using following data:

- Pitch distance = 1 mm
- 100 division on circular cylinder.
- M.S. reading 4.5 mm
- 47th division coincidence with base line

Ans- (group-2 by S. S. Patel) pg.no - 21

6) In an experiment to find out refractive index of glass , the observation of refractive index are 1.73, 1.74, 1.75, 1.70, 1.85, 1.8, and 1.85

Find Average refractive index, Average absolute error, relative error and percentage error.

Ans- (group-2 by S. S. Patel) pg.no - 23

7) Define least count of vernier caliper. Calculate diameter of cylinder whose vernier scale lies between 4.6 and 4.7 cm, 7th division of vernier matches with the any one division of vernier scale. (L.C=0.01cm)

Ans- (group-2 by S. S. Patel) pg.no - 22

8) In an experiment to find out refractive index of glass ,the observation of refractive index are 1.36, 1.29, 1.33, 1.34, 1.35, 1.32, 1.31 and 1.34 .Find average absolute error, relative error and percentage error.

9) The values of refractive indices of glass are 1.29, 1.37, 1.30, 1.32, 1.34, 1.36 and 1.31. Find out the absolute, relative, percentage error.

10) A cube has length 7.206 m considering significant figures find out total area of surface and volume

Ans- (group-2 by S. S. Patel) pg.no - 27

11) Least count of a micrometer is 0.001cm. when a steel ball is gripped between the ends of micrometer screw, the edge of circular scale lies between 1.3 and 1.4 cm and 60th division of circular scale matches with a division on main scale. Calculate diameter and volume of the sphere. Zero error is not given.

Ans- (group-1 by S. S. Patel) pg.no - 28

12) When a steel ball is gripped in a micrometer screw gauge, circular scale remains between 7 to 8 mm and 65th division of circular scale matches with main scale index

line. If pitch of the screw is 1 mm, and there are 100 division on circular scale, find the diameter of the ball.

Ans- (group-1 by S. S. Patel) pg.no - 27

13) Calculate the volume of a cube from the following observation:

- 10 division of a cm on M.S.
- 10 equal division of V.S.
- No. zero error
- the observation for cube length

(a) M.S. reading 1.40 cm

(b) 7th division of V.S. coincide.

Ans- (group-2 by S. S. Patel) pg.no - 20

Notes – Another same Numerical based on given text.

Unit -2 : Static & Current Electricity

Q:2(A) – (1 Mark)

1) State the ohms law.

Ans- Under a definite physical condition the current (I) flowing through the conductor is directly proportional to the potential difference (V) applied across its ends.

Ans- (group-2 by S. S. Patel) pg.no -53

2) What do you mean by Seebeck effect?

Ans – Whenever the junction of two dissimilar metals are kept at different temperatures an e. m. f is produced. This is called Seebeck effect or thermo-electric effect.

Ans- (group-2 by S. S. Patel) pg.no - 66

3) State the Joule's law.

Ans- (group-2 by S. S. Patel) pg.no -61

4) What do you mean by Peltier effect?

Ans – When an electric current is passed through a junction of two dissimilar metals heat is either absorbed or evolved at the junction depending on the direction of current. The effect is called Peltier effect. Peltier effect is reversible.

Ans- (group-2 by S. S. Patel) pg.no -68

5) 1 kWh = ...3600000....J

6) Is Peltier effect is reversible? Why?

Ans- (group-2 by S. S. Patel) pg.no -68

7) Define : a) Charge, b) electric field, c) electric current, d) electric power, e) watt, f)

potential difference ,g) Electrolyte ,h) Electrolyte cell , i) Anode , j) Cathode , k) Electrode ,l) ions ,m) Anions ,n) Cations

Ans- (group-2 by S. S. Patel) pg.no – 34 to 70

8) Define: Coulomb's law.

Q:2(B) – (2 Mark)

1) State limitations of ohms law.

Ans- (group-2 by S. S. Patel) pg.no - 54

2) Write disadvantage of series connection.

Ans- (group-2 by S. S. Patel) pg.no -56

3) State the coulomb's inverse square law. Prove that $F = 9 \times 10^9 \frac{Q_1 Q_2}{d^2}$

Ans- (group-2 by S. S. Patel) pg.no - 34

4) What do you mean neutral temp. and inversion temp?

Ans- (group-2 by S. S. Patel) pg.no - 67

5) Define: specific resistance. Give its properties and also prove that $\rho = R.A/L$

Ans- (group-2 by S. S. Patel) pg.no - 58

6) Write the sign convention for applying Kirchhoff' rules.

Ans- (group-2 by S. S. Patel) pg.no - 61

7) Two Charges of $4 \mu\text{C}$ and $16 \mu\text{C}$ are placed 40 cm apart in air, calculate the force between them.

Ans- (group-2 by S. S. Patel) pg.no -76,77

8) The potential difference across a resistance of 14 ohm is 35 volt.find the current through it.

Ans- (group-2 by S. S. Patel) pg.no - 79

9) 1600 joule of work is done in moving a charge 25 coulomb from one point to other. Calculate the potential difference between them.

Ans- (group-2 by S. S. Patel) pg.no -79

10) Write advantage of the parallel connection.

Ans- (group-2 by S. S. Patel) pg.no – 57

11)Write characteristics of electric field lines.

12) Mention Advantages of parallel combination of resistance.

13) Explain Kirchhoff's junction law.

Q:2 A/B or Q:3 – (4 Mark)

1) Explain series and parallel combination of resistance. Derive its formula.

Ans- (group-2 by S. S. Patel) pg.no – 55,56,57

2) Explain the Kirchhoff's junction and loop law.

Ans- (group-2 by S. S. Patel) pg.no -59,60 ,61

3) State and prove Faraday's law of electrolysis.

Ans- (group-2 by S. S. Patel) pg.no – 71,72

4) Explain electrolysis and electroplating process.

Ans- (group-2 by S. S. Patel) pg.no – 69,73

- 5) Explain faraday's second law of electrolysis.
- 6) Give the brief difference between primary and secondary cell.
- 7) Define: Joule's law and prove heating effect of current is $H = VIt/J$ and $H = V^2t/RJ$.
Ans- (group-2 by S. S. Patel) pg.no -61,62
- 8) Explain Daniel and Leclanche cell.
Ans- (group-2 by S. S. Patel) pg.no -74
- 9) Three resistances of 7 ohm, 12 ohm, and 21 ohm are connected in (i) series (ii) parallel. Find effective resistance in each case.
Ans- (group-2 by S. S. Patel) pg.no - 80
- 10) Resistances 6 ohm, 10 ohm, 12 ohm are connected in parallel and then to a battery of 20V, Find out total resistance and total current passing through it.
Ans- (group-2 by S. S. Patel) pg.no - 78
- 11) A lamp is marked 50 volt, 100 watt. What is its resistance? How much current flows through it?
Ans- (group-2 by S. S. Patel) pg.no - 83
- 12) Three resistances of 9 ohm, 12 ohm and 27 ohm are connected in a) series and b) parallel. Find the effective resistance in each case.
- 13) Calculate the heat generated when a current of 10 ampere flows through a wire of resistance 16.8 ohms for 5 minutes. Take $J = 4.2$ Joule/cal
Ans- (group-2 by S. S. Patel) pg.no -81
- 14) Calculate the heat generated when a current of 3 ampere flows through a wire of resistance 12.6 ohms for 2 minutes. Take $J = 4.2$ Joule/cal.
- 15) Three resistance 5Ω , 10Ω and 30Ω are joined in parallel with 12V battery. Find out (a) Current passing through each resistance (b) The total current of the circuit
Ans- (group-2 by S. S. Patel) pg.no -86
- 16) A lamp is marked 220 volt, 100 watt. What is its resistance? How much current flows through it?
Ans- (group-2 by S. S. Patel) pg.no - 83
- 17) An electric iron of resistance 50 ohm generates 378 k.cal of heat in 30 minutes, What is the voltage of the mains?
Ans- (group-2 by S. S. Patel) pg.no - 82
- 18) Calculate the potential at a point 0.4 m from a charge of 22×10^{-9} coulomb placed in a medium of dielectric constant 2.25.
Ans- (group-2 by S. S. Patel) pg.no - 79

Notes – Another same Numerical based on given text.

Unit -3 : General Properties of Matter

Q:3(A) - 1 (Marks)

- 1) Define the terms: 1. elasticity, 2. Deforming force, 3. Restoring force, 4. Elastic body 5. Plastic body, 6. Young modulus and modulus rigidity 7. Bulk modulus, 8. Cohesive force, 9. Adhesive force, 10. Surface tension, 11 elastic limit, 12 molecular range 13. Viscous force 14. Terminal velocity, 15. Stream line, 16. Viscosity

Ans- (group-1 by S. S. Patel) pg.no – 64 to 85

- 2) Write down angle of contact and shape of meniscus for water and mercury.

Ans- (group-1 by S. S. Patel) pg.no - 76

- 3) What is strain? Explain type of strain.

Ans- (group-1 by S. S. Patel) pg.no - 66

- 4) Write statement of Stoke's law.

Ans- (group-1 by S. S. Patel) pg.no - 85

- 5) What is stress? Explain type of stress.

Ans- (group-1 by S. S. Patel) pg.no – 64 to 65

- 6) What is the distance range between two molecules in same substance?

Q:3(B) – (2 Marks)

- 1) Write unit and practical application of surface tension.

Ans – N/M and dyne/ cm.

Ans- (group-1 by S. S. Patel) pg.no - 76

- 2) State and briefly explain Hooks law.

Ans- (group-1 by S. S. Patel) pg.no - 67

- 3) Define velocity gradient with proper unit.

Ans- (group-1 by S. S. Patel) pg.no - 82

- 4) Explain limit of proportionality with diagram. (stress strain diagram)

Ans- (group-1 by S. S. Patel) pg.no - 70

- 5) Briefly explain Reynolds's number

Ans- (group-1 by S. S. Patel) pg.no - 84

- 6) A wire is stretched to double the length. What will be the longitudinal strain?

Ans- (group-1 by S. S. Patel) pg.no - 68

- 7) Convert surface tension of 470 CGS unit into SI unit.

Ans- (group-1 by S. S. Patel) pg.no - 97

- 8) There is a tube lying in a horizontal plane having a diameter of 1 cm, water flows in a tube at the rate of 12 cm/s, If viscosity of water is 0.01 CGS and density of water is 1 CGS unit. Calculate Reynolds's number.

Ans- (group-1 by S. S. Patel) pg.no – 98

- 9) Enlist two applications of surface tension.

- 10) Explain longitudinal strains.

- 11) Explain volume stress and shearing stress.

- 12) Discuss cohesive force and adhesive force.

Q:3 A/B or Q:3 – (4 Marks)

- 1) Explain Laplace's molecular theory.

Ans- (group-1 by S. S. Patel) pg.no - 75

- 2) Give the example of factor of safety and explain it.

Ans- (group-1 by S. S. Patel) pg.no - 72

- 3) Draw and explain angle of contact theory $\theta < 90^\circ$ and $\theta > 90^\circ$.

Ans- (group-1 by S. S. Patel) pg.no - 76

- 4) Describe the method to determine surface tension of given liquid.
 Ans- (group-1 by S. S. Patel) pg.no – 78 ,79
- 5) Explain experimental method for the determination of Young's modulus.
 Ans- (group-1 by S. S. Patel) pg.no – 68 ,69
- 6) A load of 4.0 kg is suspended from a ceiling through a steel wire of length 20 m and radius 2.0 mm. It is found that the length of wire increases by 0.31 mm as equilibrium is reached. Find Young's Modulus of steel. Take $g = 3.1 \pi \text{ m/s}^2$
 Ans- (group-1 by S. S. Patel) pg.no – 86 ,87
- 7) Calculate the radius of a capillary tube in which water rises up to 3 cm. ($T = 72 \times 10^{-3}$ S.I units)
 Ans- (group-1 by S. S. Patel) pg.no - 90
- 8) Water rises up to 3.6 cm in a capillary tube of diameter 0.4 mm immersed vertically in water. How far will it rise in a tube of diameter 0.3 mm?
 Ans- (group-1 by S. S. Patel) pg.no – 91
- 9) Give the example of problem based on surface tension.
 Ans- (group-1 by S. S. Patel) pg.no – 81
- 10) A capillary tube of radius 0.5 mm is dipped in water. How far will the water rise in the tube? Surface tension of water is $7 \times 10^{-2} \text{ N/m}$.
 Ans- (group-1 by S. S. Patel) pg.no - 90
- 11) When a capillary is immersed vertically in water, water achieves height of 3cm in it. If surface tension of water is $7 \times 10^{-2} \text{ N/m}$, find out radius of capillary. (Angle of contact for water is zero. Gravitational acceleration $g = 980 \text{ cm/s}^2$ and density $d = 1 \text{ g/cm}^3$)
 Ans- (group-1 by S. S. Patel) pg.no - 92
- 12) A load of 4 kg is suspended from a ceiling through a steel wire of radius 2 mm. Find the tensile stress developed in the wire when equilibrium is achieved .Take $g = 3.1 \pi \text{ m/s}^2$.
 Ans- (group-1 by S. S. Patel) pg.no - 86
- 13) A load of 8 kg is suspended from a ceiling through a steel wire of length 40 m and radius 4 mm. It is found that the length of the wire increases by 0.62 mm as equilibrium is reached. Find Young's modulus of steel. Take $g = 3.1 \pi \text{ m/s}^2$
 Ans- (group-1 by S. S. Patel) pg.no - 86
- 14) 10 kg mass is suspended at the one end of copper wire of 3 m length and 7 mm diameter, find out increase in length. Y for copper = $1.1 \times 10^{12} \text{ dyne/cm}^2$.
 Ans- (group-1 by S. S. Patel) pg.no - 88
- 15) When a capillary is immersed vertically in water, water achieves height of 4.2 cm in it. If surface tension of water is $7 \times 10^{-2} \text{ N/m}$, find out radius of capillary. (Angle of contact for water is zero. Gravitational acceleration $g = 980 \text{ cm/s}^2$ and density $d = 1 \text{ g/cm}^3$)

Ans- (group-1 by S. S. Patel) pg.no - 92

- 16) A capillary tube of diameter 0.5 mm is immersed vertical in water of density 1 gm/cm^3 . Water rises to a height of 2.5 cm in the tube if angle of contact for water is 0° , calculate its surface tension.

Ans- (group-1 by S. S. Patel) pg.no - 92

- 17) A capillary tube of radius 0.5 mm is dipped in water. How far will the water rise in the tube? Surface tension of water is $7 \times 10^{-2} \text{ N/m}$. Angle of contact between water and glass is 0° . Gravitational acceleration is 9.8 m/s^2 . Density of water 10^3 kg/m^3 .

Ans- (group-1 by S. S. Patel) pg.no - 92

- 18) Calculate the radius of a capillary tube in which water rises up to 3 cm. ($T = 72 \times 10^{-3} \text{ S.I unit}$)

Ans- (group-1 by S. S. Patel) pg.no - 90

- 19) 5 kg mass is suspended at the one end of steel wire of 2 m length and 5 mm diameter, find out increase in length. Y for steel = $1.1 \times 10^{12} \text{ dyne/cm}^2$.

Ans- (group-1 by S. S. Patel) pg.no - 88

Notes – Another same Numerical based on given text.

Unit - 4 : Heat Transfer

Q:4(A) – (1 Marks)

- 1) Write a statement of Kirchoff's law

Ans – The value of emissivity and absorptivity equal for any surface.

$$a = e$$

Ans- (group-1 by S. S. Patel) pg.no – 104

- 2) Write a statement of Stefan-Boltzmann law.

Ans- (group-1 by S. S. Patel) pg.no – 104

- 3) Define: (1) Absorptivity (2) Total emissive power (3) Spectral emissive power (4) emissivity (5) Heat (6) temperature gradient (7) Calorie (8) Heat capacity (9) Specific Heat (10) Conduction (11) convection (12) radiation (13) good conductor (14) bad conductor (15) Variable state (16) steady state. (17) Heat (18) Calorie .

Ans- (group-1 by S. S. Patel) pg.no – 101 to 111

- 4) Write the unit of thermal conductivity Q.

Ans- (group-1 by S. S. Patel) pg.no – 107

- 5) Give Relation between $C_p - C_v$.

Ans- (group-1 by S. S. Patel) pg.no – 112

Ans = R

- 6) What is ideal gas equation?

Ans - $PV=nRT$

Ans- (group-1 by S. S. Patel) pg.no –116

7) What is temperature gradient G?

Ans- (group-1 by S. S. Patel) pg.no – 107

8) Give a unit of thermal conductivity.

9) Define: molar specific heat.

Q:4(B) – (2 Mark)

1) What is anomalous expansion of water?

Ans- (group-1 by S. S. Patel) pg.no – 102

2) Give relation between Kelvin, Celsius scale and Fahrenheit Celsius scale.

Ans- (group-1 by S. S. Patel) pg.no – 116 to 117

3) Explain perfect black body or cavity radiation.

Ans- (group-1 by S. S. Patel) pg.no – 103

4) Convert 27°C into Kelvin scale

Ans- (group-1 by S. S. Patel) pg.no – 116 to 117

5) Convert 37°C into Fahrenheit scale

Ans- (group-1 by S. S. Patel) pg.no – 116 to 117

Q:4 A/B or Q:6 – (4 Mark)

1) State and explain three mode of Heat transfer.

Ans- (group-1 by S. S. Patel) pg.no –101 to 102

2) Describe sear's method to find coefficient of Heat conduction for good conductors.

Ans- (group-1 by S. S. Patel) pg.no –108

3) Explain lee's method to find coefficient of Heat conduction for bad conductors.

Ans- (group-1 by S. S. Patel) pg.no –109

4) Distinguish good conductor and bad conductor of heat based on their state.

5) Draw and explain law of thermal conductivity.

Ans- (group-1 by S. S. Patel) pg.no – 106 to 107

6) Explain good conductor and bad conductor, also write condition for variable state and steady state.

Ans- (group-1 by S. S. Patel) pg.no – 105 to 106

7) For which value of the temperature will the values of Fahrenheit scale and Kelvin scale be equal?

Ans - (group-1 by S. S. Patel) pg.no – 127

Ans – 574.8

8) A person has fever 101. What is the temperature scale here? Convert the temperature in remaining two scales.

Ans- (group-1 by S. S. Patel) pg.no – 121

Ans – 311.33

9) The inside and outside temperature of a glass window plane are 25°C and 20°C respectively. The window is 3 mm thick. Find its area if 40 Kcal of heat escapes in a minute $K=0.0002 \text{ kcal/m}^2\text{CS}$.

Ans- (group-1 by S. S. Patel) pg.no - 117

- 10) Write formula showing relation between Celsius scale and Fahrenheit scale and find 37 degree Celsius equal to how many degree Fahrenheit.

Ans- (group-1 by S. S. Patel) pg.no - 117

- 11) Nickel plate of thickness 4 mm has a Temperature difference of 32 degree Celsius between its faces. It Transmits 200 kcal per hour through an area of 5 cm^2 . Calculate the normal conductivity of nickel.

Ans- (group-1 by S. S. Patel) pg.no - 118

- 12) A person has fever 110. What is the temperature scale here? Convert the temperature in remaining two scale

Ans- (group-1 by S. S. Patel) pg.no - 121

- 13) Find the quantity of heat conducted in 10 minutes across a silver sheet of $40 \text{ cm} \times 30 \text{ cm}$, thickness 6mm. If its two faces are at temperature of 40° C and 30° C , k for silver = $0.1 \text{ Kcal/m}^\circ\text{CS}$.

Ans- (group-1 by S. S. Patel) pg.no - 118

- 14) Inner surface of furnace is at 900° C . Wall of furnace is of 60 cm thickness and 1.5 m^2 area. Its thermal conductivity is 0.4 watt/mk . Calculate rate of heat transfer. The temperature of outside wall is 200° C .

Ans- (group-1 by S. S. Patel) pg.no - 120

Notes – Another same Numerical based on given text.

Unit – 5 : Semiconductors & Nanotechnology

Q:5-(A) – (1 Mark)

- 1) Define P-N junction.

Ans- (group-2 by S. S. Patel) pg.no – 140

- 2) What do you mean by biasing?

Ans- The process of to provide external energy to given device that is called biasing.

- 3) Give the symbol of P-N junction.

Ans- (group-2 by S. S. Patel) pg.no – 142

- 4) Define : superconductor

Ans- The property of conductor at low temperature. Which is called superconductor.

Ans- (group-2 by S. S. Patel) pg.no – 135

- 5) Give a types of semiconductor.

- 6) What is the relation between isotopic mass and critical temperature in superconductor?

- 7) mention application of superconductor.

- 8) What do you mean by threshold voltage?

Ans – The value of voltage increases beyond a point, the current starts increasing rapidly. This voltage known as a threshold (knee/ or cut in) voltage.

Ans- (group-2 by S. S. Patel) pg.no – 144

9) Define critical temperature.

Ans- (group-2 by S. S. Patel) pg.no – 135

10) What is nano science?

Ans-Nanoscience is the study of structures and materials on the scale of nanometers.

Ans- (group-2 by S. S. Patel) pg.no –

11) Write the name of energy band in solids.

Ans- Conduction band, Valence band and forbidden energy gap.

Ans- (group-2 by S. S. Patel) pg.no – 128,129

12) What is the majority charge carrier in P-type and N-type semiconductor?

Ans- (group-2 by S. S. Patel) pg.no – 141,142

Q:5(B) – (2 Mark)

1) Write the difference between Type-1 and Type-2 superconductor.

Ans- (group-2 by S. S. Patel) pg.no – 138

2) Draw the symbol of PNP and NPN transistor.

Ans- (group-2 by S. S. Patel) pg.no – 149

3) Prove that superconductor are perfect diamagnetic material.

Ans- (group-2 by S. S. Patel) pg.no – 136

4) Define below term (a) valence band (b) conduction band (c) energy band

Ans- (group-2 by S. S. Patel) pg.no – 129

5) Draw the graph of V-I characteristic of diode si-ge.

Ans- (group-2 by S. S. Patel) pg.no – 143

6) What is rectifier? Why P-N junction diode is used as a rectifier.

Ans- (group-2 by S. S. Patel) pg.no – 145

7) Write a shot note nano materials.

Ans: content should be covered like (1) Synthesis of Nanomaterials (2) properties of Nanomaterials (3) Exceptional properties of Nanomaterials and (4) Application of Nanomaterials, for that you go through group-2 by S. S. Patel pg.no – 162,163,164,165.

8) What is rectification?

Ans- (group-2 by S. S. Patel) pg.no – 145

9) Draw circuit of bridge rectifier.

10) Mention various applications of nano-technology.

11) Draw the input and output characteristics of transistors.

Q:5 A/B or Q:6 – (4 Marks)

1) Explain the P-N junction formation.

Ans- (group-2 by S. S. Patel) pg.no – 140

2) Explain the extrinsic and intrinsic semiconductor.

Ans- (group-2 by S. S. Patel) pg.no – 132

3) Explain forward and reverse bias condition of P-N junction diode.

Ans- (group-2 by S. S. Patel) pg.no – 143,145

4) Explain the properties of superconductor.

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- Ans- (group-2 by S. S. Patel) pg.no – 136
- 5) Explain half wave and full wave rectifier.
Ans- (group-2 by S. S. Patel) pg.no – 146,147
- 6) Write Expectation from nanotechnology
Ans- (group-2 by S. S. Patel) pg.no – 171
- 7) Explain : Fullerene, Bucky-ball , carbon nanotubes.
Ans- (group-2 by S. S. Patel) pg.no – 168,169
- 8) Classification of solid on based of energy band diagram.
Ans- (group-2 by S. S. Patel) pg.no – 129
- 9) Explain CVD, NEMS, Transmission lines.
Ans- (group-2 by S. S. Patel) pg.no – 163,166,
- 10) A change in emitter current of 800mA brings change in collector current of 7.9mA. Find out base current to bring change of 7.9 mA into collector current. Also find values of α and β
Ans- (group-2 by S. S. Patel) pg.no - 173
- 11) Define superconductivity. Find the critical temperature of superconducting lead at 5K , which has critical temperature 7.26 K at zero magnetic field and a critical magnetic field of 8×10^5 A/m at 0 k.
Ans- (group-2 by S. S. Patel) pg.no - 172
- 12) A change in emitter of 8×10^{-3} ampere brings change in collector of 7.9×10^{-3} ampere. Find out the change in base current.
Ans- (group-2 by S. S. Patel) pg.no - 173
- 13) Calculate the critical current that flows through a long thin superconducting wire of aluminum of diameter 10^{-3} meter. The value of $H_c = 7.9 \times 10^3$ ampere/meter.
Ans- (group-2 by S. S. Patel) pg.no - 172
- 14) The magnetic field intensity in Hg at $T=0$ K is $\frac{4.1 \times 10^5}{4\pi}$ A/m and $\frac{3 \times 10^5}{4\pi}$ A/m at 2.3 K.
Calculate the critical temperature
Ans- (group-2 by S. S. Patel) pg.no - 172
- 15) What is meant by critical temperature? The critical temperature of Hg with isotopic mass 200 is 3.185 K. Calculate its critical temperature when its isotopic mass changes to 203.5.
Ans- (group-2 by S. S. Patel) pg.no - 173

Notes – Another same Numerical based on given text.

Unit – 6 : Laser & Optical Fiber

Q:6(A) – (1 Mark)

- 1) Write the full form of laser.

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Ans. Light Amplification by Stimulated Emission of Radiation

Ans- (group-2 by S. S. Patel) pg.no – 219

2) Define : Newton's, Maxwell's theory, Huygens's, and max plank's theory

Ans- (group-2 by S. S. Patel) pg.no – 198

3) Gaussian formula $1/f = \dots\dots$

Ans. Gaussian formula $1/f = 1/D_o + 1/D_i$

Ans- (group-2 by S. S. Patel) pg.no – 204

4) Define : Reflection.

5) Define : focal point, optical centre, axis of lenses, object distance, image distance, Aperture, focal power, centre of curvature, Magnification, Newtonian formula

Ans- (group-2 by S. S. Patel) pg.no – 210,211,212

6) Mention two application for polarization.

Ans. Polarimetry, spectroscopy, spectrograph, three dimension pictures, Spectacles (sunglass), to reduce glare in motor-car

Ans - 208

7) Define.: lens

Ans- (group-2 by S. S. Patel) pg.no – 209

8) Velocity of light in air = 3×10^8 m/s

9) What is reflection of light?

Ans- (group-2 by S. S. Patel) pg.no – 205

Q:6(B) – (2 Mark)

1) Mention various characteristics of electro-magnetic waves.

Ans- (group-2 by S. S. Patel) pg.no – 199

2) Define: spontaneous and stimulated emission, population inversion of electron, optical pumping.

Ans- (group-2 by S. S. Patel) pg.no – 219,220

3) Enlist types of lenses and explain each in brief.

Ans- (group-2 by S. S. Patel) pg.no – 209

4) Write use of lenses.

Ans- (group-2 by S. S. Patel) pg.no – 213

5) Write properties of laser.

Ans- (group-2 by S. S. Patel) pg.no – 222

6) Find the velocity of light in glass. Given, refractive index of glass 1.5.

Ans- 2×10^8 m/s

Ans- (group-2 by S. S. Patel) pg.no – 241

7) Determine the magnifying power of lens having focal length 3 cm.

Ans- $M = 9.33$

Ans- (group-2 by S. S. Patel) pg.no – 242

8) Velocity of light in air is 3×10^8 m/s, and velocity in water is 2.25×10^8 m/s. calculate refractive index of water.

Ans – 1.33

Ans- (group-2 by S. S. Patel) pg.no – 241

9) Determine the magnifying power of lens having focal length 3 Cm.

Ans- (group-2 by S. S. Patel) pg.no – 242

Q:6 A/B or Q:6 – (4 Marks)

- 1) Explain reflection of light with laws and properties.
Ans- (group-2 by S. S. Patel) pg.no – 201,202
- 2) Explain reflection of light.
Ans- (group-2 by S. S. Patel) pg.no – 201
- 3) Explain Dispersion of light.
Ans- (group-2 by S. S. Patel) pg.no – 206
- 4) Write a short note on He-Ne laser.
Ans- (group-2 by S. S. Patel) pg.no – 223,224
- 5) Explain total internal Reflection of light in optical fiber cable.
Ans- (group-2 by S. S. Patel) pg.no – 227
- 6) Explain acceptance angle and numerical aperture of optical fiber.
Ans- (group-2 by S. S. Patel) pg.no – 231
- 7) Write short note on ruby laser?
Ans- (group-2 by S. S. Patel) pg.no – 221
- 8) Write the application of laser.
Ans- (group-2 by S. S. Patel) pg.no – 223
- 9) Explain the principle, construction. And working of optical fiber.
Ans. principle is Total internal Reflection, you can find it on (group-2 by S. S. Patel) pg.no – 227, For construction, (group-2 by S. S. Patel) pg.no – 229. For working (group-2 by S. S. Patel) pg.no – 224
- 10) An image of height 2.5 cm is obtained when an object of height 10 cm is placed at a distance of 40 cm from a convex mirror. Determine focal length and the magnification.
Ans - -13.33cm
Ans- (group-2 by S. S. Patel) pg.no – 240
- 11) An object is placed at a distance of 15 cm and an image from a convex lens is formed at a distance of 30 cm. calculate focal length and power of lens.
Ans -10
Ans- (group-2 by S. S. Patel) pg.no – 241
- 12) A step index fiber has core refractive index of 1.35 and relative refractive index difference is $\Delta = 0.02$. Find the numerical aperture and the acceptance angle.
Ans – 15.66°
Ans- (group-2 by S. S. Patel) pg.no – 243
- 13) What are the main parts of optical fiber cable? A parabolic graded index fiber has $n_1 = 1.5$ and $n_2 = 1.45$. Find the index at a point where $r = a/2$, midpoint on the radius.
- 14) Define refractive index. Find the velocity of light in glass. Given, refractive index of glass 1.5.
Ans- (group-2 by S. S. Patel) pg.no - 241
- 15) Calculate the refractive index of the core and cladding material of an optical fibre with numerical aperture 0.11 and relative refractive index difference is 0.011.
Ans- (group-2 by S. S. Patel) pg.no - 243
- 16) A glass-clad fiber is made with core glass of refractive index 1.58 and cladding is obtained by doping impurities to give a fractional index difference of $\Delta = 0.0004$.

Determine the cladding refractive index and numerical aperture.

Ans- (group-2 by S. S. Patel) pg.no - 243

17) Velocity of light in glass 2×10^{10} cm/ sec. and that of it in air is 3×10^8 m/ sec.
Determine the refractive index of glass

Ans- (group-2 by S. S. Patel) pg.no - 241

18) An object is placed at a distance of 75 cm from convex lens of focal length of 50 cm.
Calculate the image distance for it.

Ans- (group-2 by S. S. Patel) pg.no - 241

19) Calculate the focal power of a convex lens having focal length 20 cm.

Ans- (group-2 by S. S. Patel) pg.no - 241

20) An image of height 5 cm is obtained when an object of height 10 cm is placed at a distance of 50 cm from a convex mirror. Determine, focal length and the magnification.

Ans- (group-2 by S. S. Patel) pg.no - 241

21) A fiber, 8 km in length, has an input power $300 \mu\text{w}$ and output power of $10 \mu\text{w}$. What is loss per km?

Ans- (group-2 by S. S. Patel) pg.no - 243

22) Give brief description of He-Ne laser.

Notes – Another same Numerical based on given text.