Total No. of Questions : 4]

SEAT No. : ____

P2

[Total No. of Pages : 2

FE/Insem./APR - 2
F.E. (Common)
107002 : ENGINEERING PHYSICS
(2019 Pattern) (Semester - II)

Time : 1 Hour] ***[Max. Marks : 30***

Instructions to the candidates:

1) ***Solve either Q. No. 1. or Q. No. 2. and Q. No. 3. or Q. No. 4.***
2) ***Neat diagrams must be drawn whenever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of logrithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
5) ***Assume suitable data, if necessary.***
6) ***All questions carry equal marks.***

Q1) a) Explain with neat diagram interference in thin parallel film in reflected system. calculate the total path difference. Obtain the condition of maximum and minimum. **[6]**

b) Explain with diagram how principle of interference is used to design antireflection coating. Derive the expression for thickness. **[5]**

c) Polarizer and Analyzer are adjusted in such a way that, they transmit maximum light. Calculate the angle of analyzer for which Intensity reduces
i) 2/3
ii) 1/5 of the original Intensity. **[4]**

OR

Q2) a) Define diffraction grating. How it is prepared? Calculate the angular width of central maximum, when it is diffracted from single slit of width 0.01 nm. $\lambda = 5500\text{A}^{\circ}$. **[6]**

b) Define double refraction. Explain Huygen's theory of double refraction. **[5]**

c) Calculate the minimum thickness of a soap film which will appear dark and bright when it is illuminated by a light of wavelength 6000A° normally. Data given $\mu = 1.43$. **[4]**

P.T.O.

Q3) a) Describe construction and working of CO_2 LASER with the help of energy level diagram. **[6]**

b) Define critical angle, acceptance angle and numerical Aperture for optical Fibre. Explain different types of mode of fibre optics communication with diagram. **[5]**

c) Calculate the maximum value of angle of incidence such that light ray can travel through the fibre. Data given : $n_1 = 1.6$, $n_2 = 1.5$. **[4]**

OR

Q4) a) When light travels denser to rarer medium, calculate the critical angle for the medium. Define acceptance angle, acceptance cone and Numerical aperture. **[6]**

b) Explain applications of LASER in industry and medical field. Discuss any one of them in details. **[5]**

c) What is Hologram. Explain the process of reconstruction of Hologram with Diagram. **[4]**

Total No. of Questions : 09]

SEAT No. : [ ]

P6486

[Total No. of Pages : 4

[5868]-102
F.E. (Semester - II)
Engineering Physics
(2019 Pattern) (Paper - II) (107002)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Question No. 1 is compulsory.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicates full marks.***
4) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
5) ***Assume suitable data, if necessary.***

Physical Constants :-

1)	***Planck's constant***	$h = 6.63 \times 10^{-34}$ ***J–S***
2)	***Mass of electron***	$m_e = 9.1 \times 10^{-31}$ ***kg***
3)	***Charge on electron***	$e = 1.6 \times 10^{-19}$ ***C***

Q1) Write the correct option with answer for the following : **[10]**

i) The wavelength λ associated with a particle of mass m moving with velocity v is given by

a) $\lambda = \frac{h}{mv}$ b) $\lambda = \frac{mv}{h}$

c) $\lambda = \frac{hv}{m}$ d) $\lambda = \frac{m}{hv}$

ii) The equation of motion of matter wave was derived by

a) Heisenberg b) Bohr

c) De Broglie d) Schrodinger

iii) In metals the band gap energy / forbidden energy gap is

a) 0 eV b) 0.7 eV

c) 1.12 eV d) > 5 eV

P.T.O.

iv) A solar cell work on the principle of

a) Photoelectric effect b) Photoluminescence effect

c) Photovoltaic effect d) Photocombustion effect

v) The relative permeability can be expressed by

a) $\mu_r = 1 + \mu_0$ b) $\mu_r = 1 + x$

c) $\mu_r = x / \mu_0$ d) $\mu_r = \mu_0 + \mu_a$

vi) Superconductivity is the phenomenon in which _____ of materials suddenly disappears below critical temperature.

a) Capacitance b) Conductivity

c) Inductance d) Resistance

vii) Ultrasonic waves have frequency

a) Less than 20 H_z b) 20 H_z to 20 kH_z

c) Greater than 20 kH_z d) None of the above

viii) In nanomaterials which of the following statement is correct.

a) Surface to volume ratio is very small

b) Surface to volume ratio is large

c) Surface to volume ratio is 1 (unity)

d) None of the above

Q2) a) Derive an equation for energy of a particle enclosed in 1D rigid box or in an infinite potential well. **[6]**

b) What is wave function Ψ? Write mathematical conditions of well behaved wave function. **[5]**

c) An electron is accelerated by a potential difference of 10 kV. What is De Broglie wavelength associated with this electron. **[4]**

OR

Q3) a) Starting from De Broglie hypothesis, derive Schrodinger's time independent wave equation. **[6]**

b) State Heisenberg's Uncertainly principle. Explain it using the concept of narrow and broad wave packet. **[5]**

c) Lowest energy of an electron in a potential well is 38 eV. Calculate the width of well. **[4]**

Q4) a) Derive an expression for conductivity of intrinsic, and extrinsic semiconductors. **[6]**

b) What is fermi level in a semiconductor? With the neat labelled diagram, draw the position of fermi level in N Type & P Type semiconductor at 0º K. **[5]**

c) A coper strip 2.0 m wide, 1.0 mm thick is placed in a magnetic field of 1.5T. If a current of 200 A is set up in the strip, calculate the Hall voltage that appears across the strip. **[5]**

Assume $R_H = 6 \times 10^{-7}$ m^3/C.

OR

Q5) a) State Hall effect. Derive an equation of Hall voltage. **[6]**

b) Define fermi level in conductors and semiconductors. Draw the position of fermi level in intrinsic, N - type & P - type semiconductors. **[5]**

c) Calculate the number of acceptors to be added to germanium sample to obtain the resistivity of 10Ωm. **[4]**

Q6) a) Explain the following terms in superconductivity : **[6]**

i) Critical Magnetic field.

ii) Meissner effect

b) Define : **[5]**

i) Magnetic induction (B)

ii) Magnetic field strength (H)

iii) Magnetization (M) and state the relation between B, M & H.

c) Explain DC & AC Josephson effect in brief. **[4]**

OR

Q7) a) Differentiate between Diamagnetism, paramagnetism and ferromagnetism. (Any Three points) **[6]**

b) What is superconductivity? Distinguish between Type I and Type II superconductors. (any four points) **[5]**

c) The transition temperature for lead is 7.2 K. However at 5K it losses the superconductivity property if subjected to magnetic field of 3.3×10^4 A/m. Find the maximum value of magnetic field which will allow the metal to retain its superconductivity at 0K. **[4]**

Q8) a) What is echo sounding technique? Using this technique explain non destructive testing for the measurement of thickness of metal sheet using ultrasonic waves. **[6]**

b) What are nanoparticles? What is nanotechnology? Explain the optical property of nanoparticle. **[5]**

c) Distinguish between Destructive and Non Destructive testing (any two points) **[4]**

OR

Q9) a) What are applications of nanoparticles? Explain any two applications of nanoparticles in brief. **[6]**

b) Explain in brief Acoustic Emission Technique of NDT and its application. **[5]**

c) Explain electrical property of nanoparticles. **[4]**

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Total No. of Questions : 9]

SEAT No. : ____

P-3919

[Total No. of Pages : 4

[6001]-4002

F.E.

ENGINEERING PHYSICS

(2019 Pattern) (Semester - II) (Credit System) (107002)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates :

1) ***Question No. 1 is compulsory.***
2) ***Q.No. 2 to Q.No. 9 carry equal marks.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***
5) ***Use of electronic calculator is allowed.***

Physical Constants :

1) ***Mass of electron*** $m_e = 9.1 \times 10^{-31}$ kg
2) ***Charge on electron*** $e = 1.6 \times 10^{-19}$ c
3) ***Planek's constant*** $h = 6.63 \times 10^{-34}$ J-sec.

Q1) Write correct option of given questions with Answer. (1 mark each) : **[10]**

i) According to Dr. Broglies hypothesis, the wavelength $\lambda = \frac{h}{p}$ is applicable for

a) Photons
b) Matter particles
c) Either matter particles or photons
d) Both matter particles and photons

ii) According to Heisenberg's uncertainty principle -

a) $\Delta x.\Delta p \geq \frac{h}{2n}$

b) $\Delta x.\Delta p \leq \frac{h}{2n}$

c) $\Delta x.\Delta p \geq \frac{h}{6n}$

d) $\Delta x.\Delta p \leq \frac{h}{4n}$

P.T.O.

iii) In Schrodinger's time independent equation _____ of a particle is independent of time.

a) Kinetic energy
b) Potential energy
c) Total energy
d) Wave function

iv) Fermi level for a metal or conductor is highest energy level occupied by electrons at _____.

a) 0ºC
b) 0ºF
c) 0ºK
d) None of the above

v) Hall effect is true for _____.

a) Metals only
b) Semiconductors only
c) For N-type semiconductors only
d) Both metal and semiconductors

vi) The magnetic materials exhibit the property of magnetisation because of _____.

a) Orbital motion of electrons
b) Spin of electrons
c) Spin of nucleus
d) All of the above

vii) A superconductor is a perfect _____ material.

a) Insulator
b) Semiconductor
c) Dielectric
d) Diamagnetic

viii) Tunneling of Cooper pairs through an insulating layer between two superconductors is called _____.

a) Josephson effect
b) Onnes effect
c) Meissner effect
d) Kerr effect

ix) With increase in size of nanoparticles its hardness _____.

a) Increases
b) Decreases
c) Remains same
d) Difficult to predict

x) In Non destructive testing (NDT) the physical and chemical properties of sample _____.

a) Changes
b) Do not changes
c) Depends on temp
d) Does not depend on temp

Q2) a) Deduce Schrodinger's time independent wave equation. **[6]**

b) State and explain Heisenberg's uncertainty principle using the except of small and large wave packet. **[5]**

c) Calculate the energy difference between the ground state and first excited state of an electron in the rigid box of length 1Aº. **[4]**

OR

Q3) a) State De Broglie's hypothesis. Derive an expression for De Broglies wavelength of an elctron accelerated by a potential difference of 'V'. **[6]**

b) Define wave function. Write the conditions of well behaved wave function. **[5]**

c) The uncertainty in the location of a particle is equal to its De Broglie wavelength. Show that the uncertainty in the velocity to a particle is equal to the particle velocity itself. **[4]**

Q4) a) With the help of bond theory of solids explain the classification of solids into conductors, semiconductors and insulators. **[6]**

b) What are solar cells? Draw I-V characteristics of solar cells and define the terms i) Short circuit current and ii) Open circuit voltage. **[5]**

c) The Hall coefficient of a specimen of a doped silicon is found to be 3.66×10^{-4} m^3/c. The resistivity of the specimen is 1×10^{-2} Ωm. Determine the mobility of the charge carriers. **[4]**

OR

Q5) a) Explain the Hall effect with a neat labelled diagram. Derive an expression for Hall voltage. **[6]**

b) Define Fermi level in semiconductors. For a P-N junction diode draw energy band picture showing the position of Fermi level in i) Zero bias and ii) Forward bias. **[5]**

c) Calculate the number of donors atoms which must be added to an intrinsic semiconductors to obtain the resistivity of 10^{-6} Ωcm. (Given mobility of electrons = 1000 cm^2/V sec.) **[4]**

Q6) a) Differentiate between diamagnetism, paramagnetism and ferromagnetism. (Any two points) **[6]**

b) Define : **[5]**

i) Magnetic permeability and

ii) Magnetic susceptibility.

Obtain the relation between them.

c) The critical magnetic field of niobium is 1×10^5 A/m at 8ºK and 2×10^5 A/m at 0ºK. Calculate the critical temperature of the element. **[4]**

OR

Q7) a) Explain artificial magnetic field in brief. Distinguish between Type-I & Type II superconductors. (Any 3 points). **[6]**

b) Explain Melssner effect in brief. Show that superconductors are characterised by perfect diamagnetism. **[5]**

c) Define the terms : **[4]**

i) Magnetic field strength (H)

ii) Magnetic induction (B)

iii) Magnetisation (M)

iv) Relation permeability (μ_r)

OR

Q8) a) What is echosounding technique? Using this technique explain non destructive testing for the measurement of thickness of a metal sheet using ultrasonic waves. **[6]**

b) What is Non Destructive Testing (NDT)? Distinguish between Non Destructive Testing and Destructive Testing. (Any two points) **[5]**

c) Write any four applications of nanotechnology in the field of automobile. Explain any one in brief. **[4]**

OR

Q9) a) Explain optical and mechanical properties of nanoparticles. **[6]**

b) What are nanoparticles? What is the effect of quantum confinement on the properties of nanoparticles? **[5]**

c) An ultrasonic pulse is sent through a copper block. The echo pulse is received after 4 μs. If velocity of ultrasonic in copper is 5000 m/s, calculate the thickness of copper block. If the reflection pulse recorded after 1.253 μs from the top what is the location of flaws? **[4]**

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Total No. of Questions—**8**] [Total No. of Printed Pages—**4+1**

Seat No.	

[5667]-1005

F.E. (First Semester) EXAMINATION, 2019

ENGINEERING PHYSICS

(Phase II)

(2019 PATTERN)

Time : 2½ Hours **Maximum Marks : 70**

***N.B.* :—** (*i*) Solve any *one* question out of Q. No. **1** *or* Q. No. **2**, Q. No. **3** *or* Q. No. **4**, Q. No. **5** *or* Q. No. **6**, Q. No. **7** *or* Q. No. **8**.

(*ii*) Figures to the right indicate full marks.

(*iii*) Neat diagrams must be drawn wherever necessary.

(*iv*) Use of electronic calculator is allowed.

(*v*) Assume suitable data, if necessary.

1. (*a*) Derive Schrodinger's time independent wave equation. [6]

(*b*) State the de Broglie hypothesis and explain any *three* properties of matter waves. [4]

(*c*) Explain tunneling effect. Explain in brief how this is used in scanning tunneling microscope. [4]

(*d*) Lowest energy of an electron trapped in potential well is 38 eV. Calculate the width of well in A.V. [Given : Mass of electron 9.1×10^{-31} kg, plank constant 6.63×10^{-34} J-s, charge on e^- 1.6×10^{-19} C]. [4]

P.T.O.

Or

2. (*a*) What is Schrodinger's equation ? Derive Schrodinger's time dependent equation. [6]

(*b*) State and explain Heisenberg's uncertainty principle. [4]

(*c*) What is wave function ψ ? Explain physical significance of $|X|^2$. [4]

(*d*) If uncertainty in position of a particle is equal to its de Broglie wavelength, show that uncertainty in velocity is equal to the velocity of the particle. Consider the product of uncertainties as h. [4]

3. (*a*) Using Fermi Dirac probability distribution function, derive an expression for the position of Fermi energy level in the intrinsic semiconductor. [6]

(*b*) Derive the ideal diode equation for a P-N junction. [4]

(*c*) Calculate the mobility of charge carriers in doped silicon whose conductivity is 100 per Ω.m and the Hall coefficient is 3.6×10^{-4} m^3/c. [4]

(*d*) What is photovoltaic effect ? Draw I V characteristics of solar cell and define fill factor. [3]

Or

4. (*a*) Explain Hall effect with figure. Derive the equation of Hall voltage and Hall coefficient. [6]

(*b*) State any *four* measures to improve efficiency of solar cell. [4]

(*c*) Calculate the conductivity of pure silicon at room temperature when concentration of carriers is 1.6×10^{10} per CC. [Given μ_e = 1500 cm^2/V-sec, μ_h = 500 cm^2/V.sec, charge on electron 1.6×10^{-19} C]. [4]

(*d*) Explain in brief concept of effective mass of electron. [3]

5. (*a*) Define superconductivity with resistance *Vs* temperature graph and example. Explain zero electrical resistance in super conductivity. [6]

(*b*) Explain DC and AC Josephson effect with diagram. [4]

(*c*) Distinguish between diamagnetism, paramagnetism and ferromagnetism (*two* points each). [4]

(*d*) Define with unit : [4]

(*i*) Magnetic field strength (H)

(*ii*) Magnetization (M).

Or

6. (*a*) Explain how information is recorded and retrieved in magneto-optical recording devices. [6]

(*b*) Explain in brief : [4]

(*i*) Absolute permeability

(*ii*) Relative permeability.

(*c*) What are SQUID ? Explain any *two* applications of SQUID. [4]

(*d*) The transition temperature of lead is 7.2 K. However, at 5 K it loses the superconducting property if subjected to magnetic field of 3.3×10^4 A/m. Find the maximum value of H which will allow the metal to retain its super conductivity at 0 K. [4]

7. (*a*) What is non-destructive testing ? State types of non-destructive techniques ? Explain ultrasonic testing technique for flaw detection. [6]

(*b*) An ultrasonic pulse is sent through a block of copper. The echo pulse is received after 4 μs. If velocity of ultrasonic in copper is 5000 m/s, calculate the thickness of copper block. If the reflection of pulse is recorded after 1.253 μs from the top, what is the location of flow ? [4]

(*c*) What is nanotechnology ? Explain applications of nanotechnology in electronic field. [4]

(*d*) What is quantum confinement ? How does it affect the properties of nano particles ? [3]

Or

8. (*a*) Explain electrical and mechanical properties of nano-particles. [6]

(*b*) Explain how nanotechnology is employed in targeted drug delivery. [4]

(*c*) An ultrasonic pulse of frequency 130 kHz is sent through a block of steel. The echo pulse is received after 1.695 μs. If velocity of ultrasonic in steel is 5900 m/s, calculate the thickness of the steel block and wavelength of the pulse. [4]

(*d*) Explain in brief how acoustic emission technique is used in non-destructive testing. [3]

Total No. of Questions : 4]

SEAT No. : ____

P1269

[Total No. of Pages : 2

OCT/FE/INSEM-2
F.E. (Phase - I)
ENGINEERING PHYSICS
(2019 Pattern)

Time : 1 Hour] ***[Max. Marks : 30***

Instructions to the candidates:

1) ***Solve any one question out of Q.1 or Q.2 and Q.3 or Q.4.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Use of electronic calculator allowed.***
5) ***Assume suitable data.***

Q1) a) Derive an expression for resultant amplitude and resultant intensity between the diffracted waves in Fraunhofer diffraction due to a single slit. **[6]**

b) Write the expression of path difference between the waves reflected in wedge shaped thin film. State the conditions for maxima and minima. Explain the application of wedge shaped thin film for testing of optical flatness. **[5]**

c) Polarizer and analyser are arranged so that amount of light transmitted them is maximum. What will be the percentage reduction in intensity of transmitted light when the analyser is rotated through i) 30°, ii) 90°. **[4]**

OR

Q2) a) What is polarised and unpolarised light? Explain how the phenomenon of polarisation of light is used in liquid crystal displays (LCD). **[6]**

b) Whis is diffraction? What are its types? Find the half angular width of the central principal maxima in the Fraunhofer diffraction pattern due to a single slit having width 12×10^{-5} cm when illuminated by light of wavelength 6000Å. **[5]**

c) A parallel beam of sodium light strikes a film of oil floating on water, when viewed at an angle of 30° from the normal, 8^{th} dark band is seen. Determine the thickness of the film.

(Given - R.I of Oil = 1.46, λ = 5890A°) **[4]**

P.T.O.

Q3) a) With the help of energy band diagram explain construction and working of single hetero-junction semiconductor laser. **[6]**

b) Define criticle angle. A step index fibre has core and cladding refractive indices 1.65 and 1.48 respectively. Calculate the values of numerical aperture and acceptance angle if it is placed in air. **[5]**

c) Explain stimulated emission of radiations. Explain its significance in production of laser. **[4]**

OR

Q4) a) What is laser? State characteristics of laser. Explain in brief any one industrial application of laser. **[6]**

b) State factors for attenuation and losses in optical fibre, explain any two factors in brief. **[5]**

c) A step index fibre has core refractive index 1.46 an a numerical aperture of 0.65. Calculate the refractive index of cladding and maximum angle at entrance when fibre is placed in air. **[4]**

Total No. of Questions : 4]

SEAT No. :

PA-1679

[Total No. of Pages : 2

[5931]-1002
F.E. (Common)
ENGINEERING PHYSICS
(2019 Pattern) (Semester - I) (107002)

Time : 1 Hour] ***[Max. Marks : 30***

Instructions to the candidates:

1) ***Solve Q.1 or Q.2 and Solve Q.3 or Q.4.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) What is Fraunhofer diffraction. State the equations for resultant amplitude and resultant intensity between the diffracted waves in Fraunhofer diffraction due to a single slit. State the conditions of maximum and minimum intensity. **[6]**

b) State and explain Malus law with proof. **[5]**

c) White light falls at an angle of 45° on a thin film of soap bubble having refractive index 1.33. At what minimum thickness of the film it will appear bright yellow of wave length 5896 A° in the reflected light. **[4]**

OR

Q2) a) What is double refraction? Explain Huygen's theory of double refraction. **[6]**

b) What is interference of light? Explain the use of thin film as antireflection coating. **[5]**

c) What is the highest order spectrum that is visible with light of wavelength 6000 A° by means of grating having 5000 lines per centimeter. **[4]**

P.T.O.

Q3) a) Explain the construction and working or a carbon dioxide laser. **[6]**

b) What are optical fibres? Distinguish between step index optical fibre and graded index optical fibre. (Any 4 pts) **[5]**

c) Calculate the numerical aperture and acceptance angle of an optical fibre having core refractive index 1.49 and cladding refractive index 1.44. **[4]**

OR

Q4) a) What are optical fibres? Draw a neat labelled diagram of cross section of optical fibre showing total internal reflection. State the advantages of optical fibre communication over the conventional communication system. (Any 4 pts.) **[6]**

b) What is holography? Explain recording of a hologram using laser. **[5]**

c) What is LASER? State the important characteristics of LASER. **[4]**

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Total No. of Questions : 4]

SEAT No. : ____

P-5368

[Total No. of Pages : 2

[6185]-51

F.E. (Common) (Insem)

ENGINEERING PHYSICS

(2019 Pattern) (Semester - I) (107002)

Time : 1 Hour] ***[Max. Marks : 30***

Instructions to the candidates:

1) ***Solve Q1 or Q2 and solve Q3 or Q4.***
2) ***Neat diagram must drawn wherever necessary.***
3) ***Figures to the right indicates full marks.***
4) ***Assume Suitable data, if necessary.***

Q1) a) Derive expression for path difference in reflected system for thin film of uniform thickness and obtain condition for maxima and minima. **[6]**

b) The resultant amplitude of wave when monochromatic light is diffracted from a single slit is $E_\theta = E_m\left(\frac{\sin\alpha}{\alpha}\right)$ starting from this obtain the condition of principal maxima and minima. **[5]**

c) How should the polarizer and analyzer be oriented so that intensity of transmitted light becomes to i) 0.50 ii) 0.25 times the maximum intensity? **[4]**

OR

Q2) a) What is double refraction? Explain Huygen's theory of double refraction. **[6]**

b) Explain the use of thin film as Antireflection coating along with equation of thickness of coating. **[5]**

c) In a plane transmission grating, the angle of diffraction for the second order principal maximum for wavelength 5×10^{-5} cm is 30º. Calculate the number of lines / cm of the grating surface. **[4]**

P.T.O.

Q3) a) Explain with neat labelled diagram construction and working of a carbon dioxide laser. **[6]**

b) What is optic fibre? Give the difference between step Index and Graded Index optic fibre (any 2). **[5]**

c) Calculate the numerical aperture and acceptance angle of an optical fibre having $n_1 = 1.49$ and $n_2 = 1.44$. **[4]**

OR

Q4) a) Explain the process of fiber optics communication system with neat block diagram. State any two advantages of fiber optics communication. **[6]**

b) What is Holography? Explain the process of hologram recording. **[5]**

c) Describe the terms in laser : **[4]**

i) Stimulated emission

ii) Pumping

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