B.Sc IV Semester Degree [NEP] Examination

Paper: OE: Energy Sources

Time:2 hours **Max Marks : 60**

Instructions to candidates:

1. Answer all the questions.

2. Draw diagrams wherever necessary.

Section - A

Answer any five (5) questions from the following 5 X 2 = 10

Q1.

a. What are renewable and non-renewable energy?

b. Mention the limitations of fossil fuels

c. What is nuclear energy?

d. What is green energy?

e. Define geothermal energy?

f. Write the characteristics of wave.

g. Define hydroelectricity?

h. Write the difference between cell and battery?

Section - B

Answer any four (4) questions from the following 4 X 5 = 20

Q2. Write a note on grid interconnection topologies.

Q3. Classify the wind energy conversion system?

Q4. Write the advantages and disadvantages of concentrated collector over flat plate collector

Q5. Write a note green house effect.

Q6. Explain any five application of solar cell.

Q7. Give any five environmental issues associated with hydrothermal power plant.

Section - C

Answer any three (3) questions from the following 3 X 10 = 30

Q8. Describe briefly conventional and non conventional energy sources.

Q9. Explain the working of single basin tidal power plant?

Q10. a)Define biomass ? Give a descriptive classification of biomass resources.

b) Describe the process of biogas generation? (5+5)

Q11. a) What are the major advantages and disadvantage of solar PV system?

b) With a neat sketch, describe the construction and operation of a solar cooker. (5+5)

Q12. What is sustainable energy? Why do we need it.

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B.Sc IV Semester Degree [NEP] Examination

PHYSICS

Paper: DSC A4: Thermal Physics and Electronics

Time: 2Hours **Max Marks: 60**

Instructions to candidates:

1. Answer all the questions.

2. Draw diagrams wherever necessary.

Section - A

Answer any five(5) questions from the following **5 X 2 = 10M**

Q1.

a) Mention the formula to convert Celsius to Fahrenheit and what is Kelvin ?

b) What is Gibb's function ?

c) Explain the formation of depletion region in an unbiased PN junction.

d) Mention the ideal characteristics of op-amp.

e) Convert $(32)_{10}$ into binary number system.

f) Write the symbol and truth table of AND gate.

Section - B

Answer any four(4) questions from the following **4 X 5 = 20M**

Q2. Derive an expression for work done during adiabatic process.

Q3.Derive an the expression for efficiency of Carnot's heat engine.

Q4. Draw the circuit diagram of full wave rectifier and explain its working.

Q5. Define common mode rejection ratio (CMRR) and derive an expression for voltage gain of inverting op-amp.

Q6. a) Convert the decimal number (65535.625) into hexadecimal number.

b) Convert (3CF.F1) hexadecimal to decimal.

Q7. Simplify the Boolean expression $Y= (A+B)\ (A+\overline{B}).\ (\overline{A}+C)$

Section - C

Answer any three(3) questions from the following **3 X 10 = 30M**

Q8. Derive Stefan's law from Planck's law.

Q9. a) Mention any two basic postulates of kinetic theory of gases. (2+3+5)

b) State and explain the law of equipartition of energy.

c) Prove clasius- claypersons latent heat equation

Q10. a) Explain the action of transistor. (5+5)

b) With circuit diagram explain the output characteristic of common emitter amplifier.

Q11. State and prove De-Morgan's first and second theorem.

Q12. a) Implement AND, OR, NOT gates using NOR gate. (5+5)

b) What do you mean by voltage follower? Explain the gain term with a circuit diagram.

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SIVS-N 184 A-18

B.Sc. IVth Semester Degree Examination

PHYSICS

(Interference, Diffraction Polarisation, Laser, Fiber optics & Computational Physics)

Paper : IV

(New)

Time : 3 Hours

Maximum Marks : 80

Instructions to Candidates:

*Answer **all** the questions from Section A, any **five** questions from Secction -B and any **four** questions from section C.*

Section - A

I. Answer **all** the following questions. **(15×1=15)**

1. What is interference of light?
2. What is the path difference for destructive interference.
3. What is zone plate?
4. State Malus' law.
5. What is meant by optical activity.
6. How many cardinal points present in optical system?
7. What is optical fiber?
8. What half wave plate?
9. What are coherent sources?
10. Define grating element.
11. Calculate the power by lens whose focal length is 0.5m.
12. Write the variable in C-program.
13. What is string constant in C - program.
14. Give an example of biaxial crystal.
15. State Brawster's law.

Section - B

II. Answer any **five** of the following : (5×5=25)

16. Give the comparison between zone plate and convex lens.
17. Write a note on Fresnel's Biprism.
18. Write a note on semiconductors laser.
19. Mention the properties of optical fiber.
20. What are the properties of O-ray and E - ray.
21. Give the analytical treatment of interference of light.
22. What are Arrays? Explain one dimensional arrays.

Section - C

III. Answer any **four** of the following questions. (4×10=40)

23. a) Derive an expression for fringe width by interference at wedge shaped film (7)

    b) Fringes of equal thickness are observed in a thin glass wedge of refractive index 1.52. The fringe spacing is 1mm and wavelength of light 5893A°, Calculate the angle of wedge in radian. (3)

24. Derive an expression for radius and area of Fresnel's half period zones. (10)

25. a) Derive the expression for thickness of quarter - wave plate. (7)

    b) Calculate the thickness of a quarter wave plate of quartz for light of wave length 6000A°. Given : $n_e = 1.553$ and $n_o = 1.544$. (3)

26. Derive an expression for Achromatic combination of lenses separated by a distance. (10)

27. a) Describe the conditions for laser action. (5)

    b) Mention the application of optical fiber. (5)

28. a) Explain basic structure of C - program. (5)

    b) Explain looping statement in C - program. (5)

Roll No. _____ [Total No. of Pages : 3

SVIS-N-303-A-18

B.Sc. IVth Semester Degree Examination

PHYSICS

(Electronics, Astrophysics, Plasma and Diagnostic Physics)

paper-6.2

(New)

Maximum Marks : 80

Time : 3 Hours

Instructions to candidates:

i. Answer all the questions from Section-A

ii. Answer any five from Section-B

iii. Answer any four from Section-C

Section-A

I. Answer the following questions in one or two sentences (15×1 = 15)

1) State Thevenine theorem
2) Why, Zener diode is heavily doped
3) What is tunnel diode
4) What is the significance of arrow in the transistor symbol
5) Mention any two advantages of SCR as a switch
6) What is an Integrated Circuits
7) What is D.C load line
8) Mention any two advantages of Oscillator
9) What is undamped Oscillation
10) What is satellite communication
11) Give the circuit symbol of X-OR gate
12) What is Black hole? Who discovered it
13) What is transport phenomena
14) What is the normal range of blood pressure
15) What can C.T scans shows

Section-B

II. Answer any **Five** Questions (5× 5= 25)

16) State and explain Norton's theorem

17) Draw and explain IV-Characteristic of PN-junction diode

18) What is light emitting diode(LED)? Explain the theory of LED

19) Discuss the Frequency modulation(FM) and mention their advantages

20) What is decimal and binary system? Explain the conversion of binary to decimal with example

21) Explain chandrashekar mass limit.

22) Explain briefly Inelastic collision in plasma

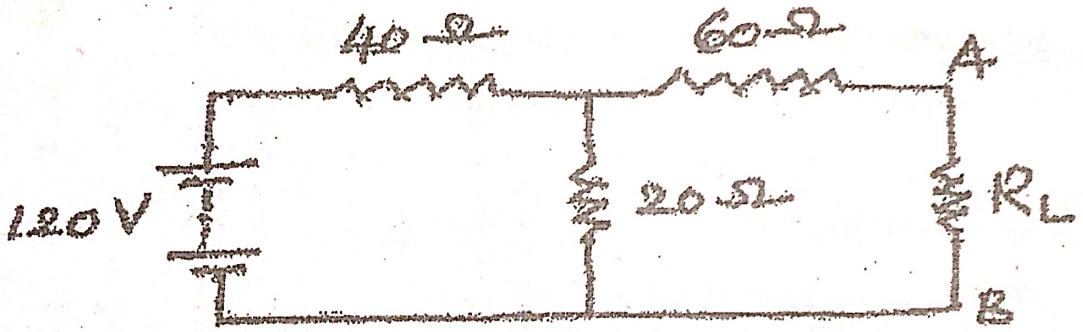
Section-C

III. Answer any **Four** Questions (4× 10= 40)

23) a) State Maximum power transfer theorem. (1+5+4)

b) Derive the condition for transfer of maximum power from a source to a load

c) Calculate the value of load resistance R_L to which maximum power may be transferred from the circuit show in fig(1). Also find the maximum power



24) a) What is transistor? Draw and explain the characteristic of NPN-transistor in CB and CE mode.

b) For the circuit of a Zener diode the input voltage Ei=120v, series resistance $Rs = 5K\Omega$, zener voltage $Vz = 50V$ and load resistance $R_L = 10k\Omega$. Find the current flowing thought zener diode (7+3)

25) a) What is an operational amplifier? Explain how an operational amplifier can be used as an Inverting amplifier

b) Explain the construction and working of a Wein bridge Oscillator

c) The frequency of a Wein bridge oscillator is 4 KHz. the value of the capacitor in the bridge network is 300pf. Find the value of the resistor. (4+4+2)

26) a) What is demodulation? What are essentials is demodulation?

b) A carrier wave of 500 watts is subjected to 100% amplitude modulation. Determine

i) Power in sidebands and

ii) Power of modulated wave

c) How is a NAND-gate formed? Explain (3+3+4)

27) a) Explain the physical properties of stars

b) What is recombination? Explain

28) a) Describe the palpatory method to measure diastolic and systolic blood pressure

b) Write a note on Radiation measurement. (5+5)

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SIVS- N- 188 A-19

B.Sc. IV - Semester Degree Examination

PHYSICS

(Physical Optics, Laser, Fibre Optics & Computational Physics)

Paper : IV

(New)

Time : 3 Hours Maximum Marks : 80

Instructions to Candidates:

1. Answer **All** questions from Section 'A'.
2. Answer any **Five** questions from Section 'B' and any **Four** questions from Section 'C'.

Section - A

I. Answer the following. (15×1=15)

1. What are two sources used to obtain a sustained interference pattern known as?
2. What is the light intensity at central fringe in Lloyd's mirror experiment?
3. What is temporal coherence?
4. Mention any one difference between Fresnel and Fraunhoffer's diffraction.
5. Define the term 'Resolving power' of a grating.
6. What should be the order of size of an obstacle to observe diffraction phenomenon?
7. What is Polarisation?
8. Brewster's angle for a certain medium is 50^0. What is the refractive index of the medium?
9. What is power of convex lens of focal length 30cm?
10. What do you mean by Aberration?
11. On what principle an optical fibre works?
12. What is stimulated emission?
13. Mention any one application of optical fibres.
14. What do you mean by reserved word in computational physics?
15. What is a variable in computational physics?

Section - B

II. Answer any **five** of the following. (5×5=25)

16. Derive the expression for fringe width in Young's double slit experiment.

17. Discuss interference at thin films. What are the factors that change the colours?

18. Give the comparison between Zone plate and Convex lens.

19. With a neat labelled diagram explain the working of Michelson's interferometer.

20. Explain Huygen's construction of ordinary (O) and Extraordinary(E) waves in uniaxial crystal for plane wave front.

21. Explain the construction of image in holography.

22. Discuss different types of logical and Relational operators.

Section - C

III. Answer any **Four** of the following. (4×10=40)

23. a) Describe an experiment to determine wavelength of light using Fresnel's Biprism.

    b) A biprism placed 6×10^{-2} meter from a slit, illuminated by light of wavelength 5896 A°. The width of fringes obtained on the screen at 72×10^{-2} meter from the biprism is 9.6×10^{-4} meter. What is the distance between two coherent sources?

    (7+3)

24. a) Derive an expression for resolution of a plane transmission grating.

    b) A grating width 2 inches is ruled with 15,000 lines per inch. Find the smallest wavelength separation that can be resolved in second order at a mean wavelength of 5000 A°. (7+3)

25. a) Explain the production and detection of

    i) Plane

    ii) Circularly

    iii) Elliptically polarised light.

    b) Calculate the thickness of a quarter wave plate of light of wave length 6000A°. Given $\mu_0 = 1.536$, $\mu_e = 1.561$. (8+2)

26. Derive an expression for focal length of two thin convex lenses separated by a distance. (10)

27. a) Explain with block diagram of the optical fibre communication system.

b) Give the advantages of optical fibre communication. (7+3)

28. a) Explain different types of logical operators.

b) Write a C-program to find specific rotation of sugar solution of length of polarimeter tube(l), angle of rotation(θ), concentration of solution(C) and specific rotation of solution(S). (5+5)

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SIVS- N- 188 A-19

B.Sc. IV - Semester Degree Examination

PHYSICS

(Physical Optics, Laser, Fibre Optics & Computational Physics)

Paper : IV

(New)

Time : 3 Hours Maximum Marks : 80

Instructions to Candidates:

1. Answer **All** questions from Section 'A'.
2. Answer any **Five** questions from Section 'B' and any **Four** questions from Section 'C'.

Section - A

I. Answer the following. **(15×1=15)**

1. What are two sources used to obtain a sustained interference pattern known as?
2. What is the light intensity at central fringe in Lloyd's mirror experiment?
3. What is temporal coherence?
4. Mention any one difference between Fresnel and Fraunhoffer's diffraction.
5. Define the term 'Resolving power' of a grating.
6. What should be the order of size of an obstacle to observe diffraction phenomenon?
7. What is Polarisation?
8. Brewster's angle for a certain medium is 50^0. What is the refractive index of the medium?
9. What is power of convex lens of focal length 30cm?
10. What do you mean by Aberration?
11. On what principle an optical fibre works?
12. What is stimulated emission?
13. Mention any one application of optical fibres.
14. What do you mean by reserved word in computational physics?
15. What is a variable in computational physics?

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PGIVS-O-1536 A-20

M.Sc. IV Semester (CBCS) Degree Examination

PHYSICS

Paper : HCT - 4.1 Statistical Mechanics

(Old)

Time : 3 Hours **Maximum Marks : 80**

Instruction :

*Answer **all** the questions of 15 marks and two questions of 10 marks each.*

1. a) Explain the Concept of ensemble and different types of ensembles.

   b) What are the thermodynamic potentials and deduce the Maxwell's relations from these potentials. (6+9)

(OR)

2. a) Describe the canonical ensemble for probable and most probable distribution of energies among the systems.

   b) Explain the number of phase cells in given energy range of harmonic oscillator. (10+5)

3. Describe the vibrational partition function and specific heat of a diatomic molecule and obtain other thermodynamic parameters. (15)

(OR)

4. Explain Gibb's paradox and obtain Sackur-Tetrode equation for mixing of entropy of the gases. (15)

5. a) Explain symmetric and antisymmetric wave functions for three particle wave functions.

   b) Discuss the limiting cases when the quantum statistical distribution approaches to classical statistics. (10+5)

(OR)

6. a) What are identical particles ? Explain.

   b) Derive Fermi-Dirac statistical distribution function for electron gas in metals and discuss at low and high temperatures. (5+10)

7. a) Explain the concept of Brownian motion and obtain the Langevin's theory for Brownian motion.

b) Write a note on Fokker-Planck equation of fluctuating force. (9+6)

(OR)

8. a) Describe the Einstein's diffusion relation for mobility for concentration of a solution.

b) Explain thermoelectric phenomena with any one example. (8+7)

9. Write a note on grand canonical ensemble. (10)

10. State and prove the equipartition theorem. (10)

11. Explain the Bose-Einstein distribution function. (10)

12. Write a note on Onsager reciprocity relations. (10)
