QP. Code: 47337

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# Sixth Semester B.Sc. (NEP) Degree Examination,
## August/September, 2024
## (Regular)
## PHYSICS
### Paper - I Elements of Condensed Matter and Nuclear Physics

**Time : 2 Hrs** **Max. Marks : 60**

**Instructions to Candidates:**

1) **Calculators may be allowed for solving problems.**
2) **Write intermediate steps.**
3) **Give physical meaning for symbols and notations.**

1. **Answer any SIX of the following questions.** **(2x6=12)**

a) What is Primitive cell?

b) State Weidman - Franz Law.

c) Define Magnetic susceptibility.

d) What is critical temperature?

e) Define nuclear charge density.

f) Define half - life and mean - life of radioactive element.

g) What is pair production?

h) What is controlled chain reaction?

**Answer a and b OR c and d for all the following questions.**

2. a) What is Bravais lattice ? Explain the seven types of crystal system.

b) Calculate the interplanar spacing for a 321 plane in a simple cubic lattice, whose lattice constant is $4.2 \times 10^{-10}$ m. **8+4**

**OR**

c) Give Einstein theory of specific heat of solids.

d) What is Hall effect ? Mention the applications of Hall effect. **8+4**

3. a) Give Langevin theory of diamagnetism.

b) Write a note on hard and soft magnetic materials. **8+4**

**OR**

c) Derive Clausius Mossotti equations.

d) State and explain Seebeck effect. **8+4**



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4. a) Explain constituents of nucleus and their intrinsic properties.

   b) What is binding energy? Explain the importance of binding energy curve. **8+4**

**OR**

   c) Give Gamow's theory of $\alpha$ - decay.

   d) The activity of a radioactive sample drops to $\frac{1}{16}^{th}$ of its initial value in 80 minutes, What is the half-life. **8+4**

5. a) Explain semiempirical mass formula on the basis of liquid drop model.

   b) What is nuclear reactor? Explain the parts of the nuclear reactor. **8+4**

**OR**

   c) Describe the construction and working of GM-counter.

   d) The frequency of the oscillating potential difference applied to the dees of a cyclotron is $7 \times 10^6$ Hz, determine the magnetic flux density necessary to accelerate protons.

   Given $M_p = 1.6 \times 10^{-27}$Kg $e = 1.6 \times 10^{-19}$c

**8+4**

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# Sixth Semester B.Sc. (NEP Regular) Degree Examination, August / September, 2024

## CHEMISTRY

## Paper II : Chemistry (DSC)

Time : 2 Hrs Max. Marks : 60

**Instructions:**

1. **All questions are compulsory.**
2. **Draw neat diagrams and give equations wherever necessary.**

### SECTION - A

I. Answer **any SIX** questions: **(6x2=12)**

a. Mention the role of coolant and control rods in nuclear reactor.

b. Write the biological role of potassium.

c. What are Synthons ? Give example.

d. What is Favorskii rearrangement ? Give equation.

e. What is consecutive reaction ? Give example.

f. What is photoelectric effect ?

g. What type of reagent is Barfoed reagent ? Mention its use.

h. Write the structure of 8-hydroxyquinoline and its use in inorganic analysis.

2. Answer **any THREE** questions: **(3x4=12)**

a. Explain the following with example:

i) Nuclear fission ii) Nuclear fusion

b. Write about the following:

i) Carbon dating ii) Applications of radioisotopes

c. Write the structure and functions of chlorophyll.

d. What are non-aqueous solvents ? Write the properties of solvents.



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3. Answer **any THREE** questions: **(3x4=12)**

   a. What is retrosynthesis ? Write the retrosynthesis of the benzocaine.

   b. Write the mechanism of Wagner - Meerwein rearrangement.

   c. What is Fries rearrangement ? Write its mechanism.

   d. Write the synthesis of citral.

4. Answer **any THREE** questions: **(3x4=12)**

   a. Derive the Finstein's photoelectric equation.

   b. Derive rate constant expression of unimolecular (Linde-mann hypothesis) reaction rates.

   c. Discuss the Kinetics of parallel reactions.

   d. What are emulsions ? Write their types and properties.

5. Answer **any THREE** questions: **(3x4=12)**

   a. Write the synthesis of Novocaine.

   b. Explain the following with example:

      i) Antipyretics ii) Antimalariels

   c. Write about the following:

      i) Advantages of organic reagents over inorganic reagents.

      ii) Dimethyl glyoxime structure and use in inorganic analysis.

   d. Discuss the 18 electron rule for $[Fe(CO)_5]$ and $[Mn(CO)_5]$.

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# Sixth Semester B.Sc. (NEP) Degree Examination, August/September, 2024

## (Regular)

## PHYSICS

## Paper - II Electronic in Instrumentation & Sensors

**Time : 2 Hrs** **Max. Marks : 60**

**Instructions to Candidates:**

1) **Calculation can be done using calculators.**
2) **Write the intermediate steps wherever necessary.**
3) **Give physical meaning of each symbol used.**

**1. Answer any SIX of the following questions.** **(2x6=12)**

a) What are the characteristics of AC power?

b) What is filter circuit?

c) What is mention the types of circuit breakers?

d) Draw the nature of Sine wave Square wave.

e) Define Transducer.

f) Define gauge factor of transducer.

g) State Dirichlet principle.

h) Find the Laplace transform of $e^{at}$

**2. Answer a and b OR c and d of the following.**

a) With the help of neat diagram explain working of full wave rectifier. **08**

b) Mention the difference between L-section and $\pi$ section filters. **04**

**OR**

c) Explain with block diagram the functioning of CRO. **08**

d) Mention the advantages and disadvantages of rectifier type voltmeter. **04**

**3. Answer a and b OR c and d of the following.**

a) Describe square generator with a neat labeled diagram. **08**

b) Mention difference between active and passive filters. **04**

**OR**

c) State and prove fundamental theorem of filters. **08**

d) What are Oscillators ? Briefly explain the types of Oscillators. **04**



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4. **Answer a and b OR c and d of the following.**

a) Explain unbonded resistance wire strain gauge. **08**

b) List the basic characteristics of transducers. **04**

**OR**

c) Explain construction and working of Piezoelectric transducer. **08**

d) Mention the features and applications of Thermo couple sensors. **04**

5. **Answer a and b OR c and d of the following.**

a) State & explain linearity and change scale property of fourier transform. **08**

b) Find fourier transform of $\frac{1}{t}$. **04**

**OR**

c) State and prove convolution theorem for Laplace transform. **08**

d) Find the L.T. of {sinat}. **04**

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