

SVIS-N 301 A-18
B.Sc. VIth Semester Degree Examination
PHYSICS
(Nuclear Physics and Solid - State Physics)
Paper : 6.1
(New)

Time : 3 Hours

Maximum Marks : 80

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. Two nuclei of mass number in ratio 1:8. What is the ratio of their nuclear radii.
 2. State any two limitations of shell model of nucleus.
 3. What is the orbital electron capture?
 4. What is meant by transient equilibrium?
 5. What is neutrino hypothesis?
 6. How many quark make up a proton?
 7. What is dead time of a G.M. Counter?
 8. What are Bravais lattices?
 9. What is packing fraction of a b.c.c. crystal?
 10. Draw the planes for miller indices (100).
 11. Define drift velocity of electrons.
 12. What is extrinsic semiconductors?
 13. Give any one application of Hall effect?
 14. Mention any One merit of Einstein Theory of specific heat capacity.

15. State Dulong - Petit law.

SECTION - B

II. Answer any FIVE questions.

(5×5=25)

16. What are Mesons? Explain briefly Mesons theory of nuclear forces.
17. Write a note on classification of elementary particles.
18. Mention the limitation of cyclotron. Explain how this limitation can over come?
19. Describe the powder method of X - ray diffraction.
20. What is inter planar spacing? Derive an expression for the inter planar spacing lattice.
21. Obtain an expression for electrical conductivity of a metal on the basis of free electron theory.
22. Define Hall effect. Obtain an expression for Hall co - efficient in semiconductor.

SECTION - C

III. Answer any FOUR of the following questions.

(4×10=40)

23. a) Explain the basic properties of a nucleus.
b) Calculate the B.E. per nucleon of an alpha particle, mass of proton and neutron are 1.007276U & 1.008665U respectively. The mass of alpha particle is 4.001506 U. (8+2)
24. a) What is the range of alpha particles? Describe an Bragg's experiment to determine the range of alpha particles.
b) Explain the neutrino theory of Beta decay.
c) Calculate the range of alpha particle at initial energy 5 mev. (5+3+2)
25. a) Explain briefly the quark model.
b) What is detector? Explain the working of Scintillation counter. (5+5)
26. a) Explain the various types of crystal system and their characteristic with neat sketch.
b) Describe the structure of kcl crystal.

- c) Calculate the angle of diffraction for X-ray having wave length 1.54\AA in different order 1,2,3, if the interplanar distance is 2.67\AA . (5+3+2)
27. Discuss the Kronig - Penny Model for the motion of an electron in periodic potential. (10)
28. a) What are intrinsic semiconductors? Obtain an expression for electrical conductivity of an intrinsic semiconductor.
- b) Explain Einstein's theory of specific heat capacity. (5+5)
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SVIS-O-312 A-20
B.Sc. VI Semester Degree Examination
PHYSICS
Statistical Physics, Solid State Physics and Material Science
Paper : 6.1
(Old)

Time : 3 Hours

Maximum Marks : 80

Instructions to Candidates:

Answer All the questions from Section "A", any five from Section "B" and any four from Section "C".

SECTION - A

I. Answer the following questions.

(15×1=15)

1. What are fermions?
2. State principle of priori-probability.
3. Define primitive cell.
4. State Dulong and Petit's law.
5. Give an example for donar impurity.
6. Give the value of energy gap of silicon.
7. What is thin film?
8. What is ripple factor?
9. State Debye's T^3 law.
10. Define α
11. What is Curie temperature?
12. Define magnetic susceptibility.
13. What is energy gap?
14. What is hysteresis?
15. What is magnetic levitation?

10/11/20

SECTION - B

(5×5=25)

II. Answer any **FIVE** of the following.

16. Compare three Statistics.
17. Deduce Ohm's law by considering free electron theory.
18. State and explain Bragg's law for diffraction of X-rays.
19. Distinguish between extrinsic & intrinsic semiconductor.
20. Explain pb-sn phase diagram.
21. Explain in brief Hall effect.
22. Write a note on high temperature Superconductor.

SECTION - C

III. Answer any **FOUR** of the following:

(4×10=40)

23. Derive Maxwell-Boltzmann distribution equation. (10)
 24. a) Discuss Debye's theory of specific heat of solids. (6)
b) Show how Debye's theory leads to Dulong and Petit's law. (4)
 25. a) Describe construction and working of solar cell. (5)
b) Explain NaCl crystal structure. (5)
 26. a) Explain the physics of PNP transistor. (5)
b) State and explain Curie-Weiss law. (5)
 27. a) Explain BCS theory of Superconductivity. (5)
b) Write the applications of superconductor. (5)
 28. a) Explain chemical vapourisation method of prepare thin film. (5)
b) Write the application of thin films. (5)
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SVIS-N-312 A-20
B.Sc. VI Semester Degree Examination
PHYSICS
Nuclear Physics & Solid State Physics
Paper - 6.1
(New)

Time : 3 Hours

Maximum Marks : 80

Instructions to Candidates:

- * Answer **all** the questions from 'Section - A'.
- * Answer any **five** questions from 'Section - B'.
- * Answer any **four** from 'Section - C'.

SECTION-A

(15×1=15)

I. Answer ALL the questions.

1. State any two properties of Nucleus.
2. Mention any one merits of liquid-drop model.
3. What is inverse β -decay ? Mention its importance.
4. Mention any two agricultural properties of nuclear radiation.
5. What are fermions ? Name their sub-groups.
6. What are elementary particles ?
7. What is the principle of scientillation counter ?
8. State the condition of Betatron ?
9. What is drift velocity ?
10. Define electron density of states.
11. What is energy band?
12. Define primitive cell.
13. Determine the number of atoms per unit face centred cubic (fcc) cell.
14. What is Extrinsic semi Conductor ?
15. State Dulong and petits law.

SVIS-N-103-B-21
B.Sc. VI (CBCS) Semester Degree Examination
PHYSICS
Nuclear and Particle Physics
Paper : DSE4 - PHY603T1
(New)

IA (33)

Time : 3 Hours

Maximum Marks : 80

Instructions to Candidates:

1. Answer ALL the following questions.
2. Draw diagrams wherever necessary.

SECTION - A

I. Answer any TEN of the following in two or three sentences.

(10×2=20)

- ~~1.~~ What is the value of mass of proton and neutron?
- ~~2.~~ Define atomic number & mass number.
- ~~3.~~ What are magic numbers?
4. What are nuclear models?
- ~~5.~~ Define radioactivity. IA
6. What is neutrino?
- ~~7.~~ What is Q value?
8. What is Resonance reaction?
9. Define radiation detector? -IA
10. What is cyclotron?
- ~~11.~~ What are elementary particles? IA
- ~~12.~~ What are mesons?

SECTION - B

(4×5=20)

III. Answer any FOUR of the following

13. What are basic properties of nucleus? 1 A
14. Explain Liquid drop model of nucleus.
15. Write the general properties of radioactive radiations. 1 A
16. Explain the types of nuclear reactions.
17. Write a note on G.M. Counter. 1 A
18. Write a note on elementary particles. 1 A

SECTION - C

III. Answer any FOUR of the following

(4×10=40)

19. ~~a)~~ Explain mass defect and BE. (5+5)
~~b)~~ Write a note on BE curve.
20. a) Explain Shell model (5+5)
 b) Write a note on Yukawa Theory.
21. a) State & explain Geiger's-Nuttall law (7+3)
 b) Calculate the range of α -particle at initial energy 4 Mev in aluminium.
22. a) Explain the types of nuclear reactions. 1 A (7+3)
 b) A 0.01×10^{-2} m thick ${}^7_3\text{Li}$ target is bombarded with a beam of intensity 10^{12} proton/sec. As a result of 10^8 neutrons produced. Calculate cross section of the radiation (density of Li = 50 kg/m^3).
23. Explain principle, construction and working of Scintillation counter (PMT) (10)
24. ~~a)~~ Write a note on Quark model. (5+5)
~~b)~~ What are coloured quarks & gluons.

SVIS-N-101-B-21
B.Sc. VI Semester (CBCS) Degree Examination
PHYSICS
Radiation Safety
Paper : SEC3 - PHY601T
(New)

Time : 2 Hours

Maximum Marks : 40

Instructions to Candidates:

1. Answer ALL the questions.
2. Draw diagrams wherever necessary.

SECTION - A

I. Answer any FIVE of the following.

(5×2=10)

1. What is α -decay & β -decay?
2. What are the sources of neutron decay?
3. What is pair production?
4. What is gray? Give its unit.
5. Explain RBE.
6. What is nuclear medicine?

SECTION - B

II. Answer any TWO of the following.

(2×5=10)

7. Write a note on X - rays.
8. Derive the formula for mass stopping power.
9. Write a note on dosimetry.

SECTION - C

III. Answer any TWO of the following.

(2×10=20)

10. a) Write a note on sealed and unsealed sources. (6+4)
- b) Write a note on Auger effect.
- 11) a) Derive Bethe - Bloch formula. (7+3)
- b) Write a note on neutron detectors.
- 12) a) Write a note on thermoluminescent dosimetry. (5+5)
- b) What are the hazards of MRI & ultrasonography.

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SVIS-N-344- B-22
B.Sc. VI Semester (CBCS) Degree Examination
PHYSICS
Renewable Energy and Energy Harvesting
Paper : SEC-4-PHY602T
(New)

Time : 2 Hours

Maximum Marks : 40

Instructions to Candidates:

- 1) Answer all questions.
- 2) Draw diagrams wherever necessary.

I. Answer any Five of the following in Two or Three Sentences. (5×2=10)

1. Define wind energy and Tidal energy.
2. Write the types of wind machines.
3. What is solar cell? What is Solar green house?
4. Write any two disadvantages of wave energy.
5. What are the hydropower resources.
6. What is piezoelectric effect?

II. Answer any Two of the following. (2×5=10)

7. Explain the bio-mass generation technique.
8. Write any five applications of solar pond.
9. What are the environmental impact of hydropower sources.

(2×10=20)

III. Answer any Two of the following.

10. a) Write the construction & working solar cooker. (5+5)
b) Write a note on osmotic power.
11. a) Explain Geothermal technologies. (5+5)
b) Explain the limitations of fossil fuels.
12. a) Write the characteristics of piezo electric effect. (5+5)
b) Write a note on linear generators.
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SVIS-N-343- B-22
B.Sc. VI Semester (CBCS) Degree Examination
PHYSICS
Radiation Safety
Paper : SEC-3-PHY601T
(New)

Time : 2 Hours

Maximum Marks : 40

Instructions to Candidates:

- 1) Answer all questions.
- 2) Draw diagrams wherever necessary.

I. Answer any FIVE of the following in two or three sentences. (5×2=10)

1. What is meant by Bremsstrahlung. effect.
2. What is meant by photo electric effect and compton effect.
3. Expand KERMA and ALI.
4. Write basic principle of gas detectors.
5. Write any two risks associated with diagnostic radiology.
6. Mention any two Hazards of MRI.

II. Answer any TWO of the following. (2×5=10)

7. Explain the basic concept of Alpha Beta and Neutron decay.
8. Write a note on Range and straggling.
9. Explain the working of scintillation detector.

III. Answer any TWO of the following. (2×10=20)

10. a) Write a note on sealed and unsealed sources. (5+5)
- b) Derive Bethe-Bloch formula.

11. a) Write a note on solid state detectors.
b) Explain Manography and Fluoroscopy.
 12. Explain in detail about the nuclear waste and disposal Management.
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SVIS-N-341- B-22
B.Sc. VI Semester (CBCS) Degree Examination,
PHYSICS
Nuclear and Particle Physics
Paper : DSE-4-PHY603T1
(New)

Time : 3 Hours

Maximum Marks : 80

Instructions to Candidates:

- 1) Answer all the following questions.
- 2) Draw diagrams wherever necessary.

SECTION - A

I. Answer any Ten of the following in two or three sentences. (10×2=20)

1. Define Binding energy and mass defect.
2. Define a.m.u and what is the value of 1 a.m.u in kg.
3. Mention the magic numbers.
4. Write any two assumptions of shell model.
5. State radio-active decay law.
6. Write any two properties of nuclear Radiations.
7. Mention this any two types of nuclear Reactions.
8. What is Q-value and what is the value of 1 barn?
9. What is the basic principle of scintillation cauter?
10. What is Betatran on which principle betatran works.
11. Mention the kinds of fundamental Interactions.
12. Define hypercharge and Isospin number.

SECTION - B

II. Answer any Four of the following. (4×5=20)

13. Explain basic properties of nucleus.
14. Give the expression for semi empirical mass formula and explain the terms.
15. Define half life and mean life of radio active substance and give relation between them.

16. Write a note on conservation laws in nuclear Reactions.
17. Write the principle construction and working of cyclotron.
18. Write a note on Quark model.

SECTION - C

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

19. a) Explain the basic characteristics of nuclear forms.
 b) Write a note on Yukawa's theory. (5+5)
20. a) Explain the Gamav's theory of α -decay.
 b) A certain radioactive sample has half life of 8 days. What is its disintegration constant and mean life? (7+3)
21. a) Derive an expression for Q-value.
 b) Calculate the Q-value of reaction? ${}_4\text{Be}^9 + {}_2\text{He}^4 \rightarrow {}_6\text{C}^{12} + {}_0n^1$. Given that mass $\text{Be}^9 = 9.01506$ amu $\text{He}^4 = 4.008874$ amu, ${}_0n^1 = 1.008986$ amu, $\text{C}^{12} = 12.003316$ amu and $1 \text{ amu} = 931 \text{ meV}$ (7+3)
22. Which neat diagram, describe the construction and working of GM counter. (10)
23. a) Write a note on types of accelerator.
 b) Explain construction and working fo linear accelerator. (5+5)
24. a) Explain particles and Antiparticles.
 b) Mention the properties of three generation of quarks and Leptons. (5+5)

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SVIS-N-313 A-19
B.Sc. VI Semester Degree Examination

PHYSICS

(Electronics, Astrophysics Plasma and Diagnostic Physics)

Paper - 6.2

(NEW)

Maximum Marks : 80

Time : 3 Hours

Instructions to Candidates:

1. Answer all the questions from section-A
2. Answer any five from section- B
3. Answer any four from section- C

SECTION -A

L Answer the following questions.

(15×1=15)

1. State maximum power transfer theorem.
2. Why zener diode is always connected in reverse bias?
3. What is transistor?
4. Define transistor parameter α
5. Give the circuit symbol for Tunnel diode.
6. Mention the types of MOSFET.
7. What is Bandwidth?
8. What is undamped oscillation?
9. What is negative feedback?
10. What is amplitude modulation?
11. Write the types of modulations.
12. Give the circuit symbol for NOT gate.
13. What is astrophysics?
14. How plasma reacts with electromagnetic waves?
15. What is MRI?

SECTION-B

(5/5/15)

II. Answer any five questions.

16. Distinguish between AM & FM.
17. Explain the characteristics of an open transformer in CR circuit.
18. Write a note on Wien-bridge oscillator.
19. Show that $m = \frac{V_{max} - V_{min}}{V_{max} + V_{min}}$
20. Explain construction & working of CR gate with circuit.
21. Derive expression for size of wave.
22. Discuss with graph interpretation of VLSI.

SECTION-C

(4/10-10)

III. Answer any four questions.

23. a) Write a note on DC load line. (5-5)
- b) Explain band-width of an amplifier. (5-5)
24. a) Explain construction of VLSI. (5-5)
- b) Explain PVT characteristics. (5-5)
25. Describe the physical properties of wave. (10)
26. a) Write a note on VLSI. (5-5)
- b) Describe the palpantary method to measure dynamic & static EP. (5-5)
27. a) Explain the conversions of decimal to binary with example. (5-5)
- b) Write a note on satellite communication. (5-5)

SVIS-O-313 A-19
B.Sc. VI Semester Degree Examination
PHYSICS
(Electronics, Astrophysics and Biophysics)
Paper - 6.2
(Old)

Time : 3 Hours

Maximum Marks : 80

Instructions to Candidates:

Answer All the questions from section-'A' any Five from section- 'B' and any Four from section- 'C'.

SECTION-A

I. Answer ALL the following questions.

(15×1=15)

1. Define h-parameters.
2. What is an Amplifier?
3. Define CMRR.
4. On which principle LED works.
5. Write any two applications of optical fibre.
6. Write an equation for voltage gain in inverting amplifier.
7. Write the truth table of NAND gate.
8. What is pinch off voltage in FET?
9. What is the principle on which optical fibre works?
10. State the principle of super heterodyne.
11. What is the value of Chandrashekhar limit?
12. What is nucleoside?
13. Mention any one use of zodiac- constellation.
14. What is the function of Ribosome?
15. Write the importance of chloroplast.

SECTION -B

II. Answer any FIVE of the following questions. (5×5=25)

16. Explain V-I characteristics of CE mode configuration in transistor.
17. What is non-inverting operational amplifier; derive an equation for voltage gain.
18. Write a note on Logic gates.
19. Explain FM modulation.
20. Write a note on Demodulation.
21. Explain briefly stellar properties.
22. Compare Inanimate and animate matter.

SECTION -C

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

23. Explain FET parameters and obtain relation between them.
24. Draw a circuit diagram of phase shift oscillator and explain its construction and working principle.
25. Explain Half adder and Full adder with block diagram.
26. Define numerical aperture of a fibre and Derive an expression for numerical aperture of an optical fibre.
27. Write detailed note on spectral classification of stars.
28. Write a note on membrane potential and explain evolution of life.