

(Pages : 3)

T – 1899

Reg. No. :

Name :

Sixth Semester B.Sc. Degree Examination, April 2024
Career Related First Degree Programme under CBCSS
Physics and Computer Applications
Core Course
PC 1641 : SOLID STATE PHYSICS
(2014 Admission Onwards)

Time : 3 Hours

Max. Marks : 80

SECTION – A

Very short answer type questions. Answer all ten questions of 1 mark each.

1. Define crystal structure.
2. What is a symmetry operation?
3. Give the mathematical statement of Bragg's law.
4. What is the order of resistivity at room temperature?
5. According to kinetic theory of gases, the average energy per mole of a free particle in equilibrium is?
6. $C_p = C_v$ for _____.
7. How polarizability and susceptibility are interrelated?

P.T.O.

8. Give example for a diamagnetic material.
9. Zero resistivity is known as _____.
10. Unit cell with $a = b = c$ and $\alpha = \beta = \gamma = 90$ is?

(10 × 1 = 10 Marks)

SECTION – B

Short answer type questions. Answer any **eight** questions of **2** marks each.

11. Define lattice points.
12. Differentiate crystalline and amorphous solids.
13. What are the important features of Miller indices?
14. Define Fermi energy.
15. "Electrical and thermal conductivities are intimately related." Comment on the statement.
16. What is the significance of Lorenz number (L)?
17. What is Hall effect?
18. Explain Dulong- Petit law.
19. Define polarization.
20. Distinguish type I and type II superconductors.
21. Give the significance of critical temperature on superconductivity.
22. Explain Meissner effect.

(8 × 2 = 16 Marks)

SECTION – C

Answer any **six** questions. Each question carries **4** marks.

23. Write a brief note on the seven crystal systems.
24. What is a body centred cubic structure? Obtain its atomic packing factor.
25. Derive the relation between current density and electric field.
26. What is thermal conductivity? How will you express thermal conductivity in terms of electronic properties of the metal?
27. Discuss phonon density of states.
28. How will you classify materials based on susceptibility?
29. Explain Langevin diamagnetism.
30. Briefly discuss BCS theory.
31. Compare Ferro, Ferri and Antiferromagnetism.

(6 × 4 = 24 Marks)

SECTION – D

Answer any **two** questions. Each question carries **15** marks.

32. Explain X ray diffraction. Discuss the experimental techniques of diffraction.
33. Discuss the effect of absolute temperature on electrical resistivity.
34. Using Einstein model, explain the theory of lattice heat capacity. Mention the achievements and limitations of Einstein model.
35. What is Paramagnetism? Explain the classical and quantum theory of Paramagnetism.

(2 × 15 = 30 Marks)

(Pages : 3)

T – 1901

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Sixth Semester B.Sc. Degree Examination, April 2024

Career Related First Degree Programme under CBCSS

Physics and Computer Applications

Core Course

PC 1642 : STATISTICAL MECHANICS AND QUANTUM MECHANICS

(2015 Admission Onwards)

Time : 3 Hours

Max. Marks : 80

SECTION – A

Answer all questions; each carries 1 mark.

1. What is a phase space?
2. What are bosons?
3. Define ensemble.
4. What is meant by matter waves?
5. State uncertainty principle.
6. Define photo electric effect.
7. State correspondence principle.
8. Give the relation connecting entropy and probability.
9. What is meant by delta function potential?
10. Define grand canonical ensemble.

(10 × 1 = 10 Marks)

P.T.O.

SECTION – B

Answer any **eight**; each carries **2** marks.

11. What are Bohr's postulates?
12. Distinguish between microstate and macrostate.
13. Explain Maxwell-Boltzmann distribution law.
14. Explain Bose-Einstein distribution function.
15. Give the Schrodinger equation for a free particle and explain its solution.
16. Define partition function.
17. Outline the probability interpretation of wave function.
18. Draw diagrams to represent canonical and micro canonical ensembles.
19. Mention any two deficiencies of the Planck's Quantum theory.
20. Prove the non-existence of the electron in the nucleus on the basis of uncertainty principle.
21. Write the Planck radiation formula and explain the symbols.
22. Define photoelectric work function and give the expression for it.

(8 × 2 = 16 Marks)

SECTION – C

Answer any **six**; each carries **4** marks.

23. The photoelectric threshold of tungsten is 2300\AA . Determine the energy in electron volt of the electrons ejected from the surface by ultraviolet light of wavelength 1800\AA .
24. Determine the energy of the neutron in electron volts whose de Broglie wavelength is 1\AA . Mass of neutron is 1.674×10^{-27} Kg.

25. An electron has a speed of 500 m/s correct upto 0.01%. With what minimum accuracy can you locate the position of this electron?
26. Calculate the lowest energy of an electron bound by a potential which closely approaches an infinite square well of width 2.5×10^{-10} m.
27. A particle is moving in a one dimensional potential well of width 25 \AA . Calculate the probability of finding the particle within an interval of 5 \AA at the centers of the box when it is in its state of least energy.
28. Derive time independent Schrodinger equation from the time dependent Schrodinger Equation.
29. Find the rms speed of hydrogen molecules at 100°C .
30. Derive the Maxwell - Boltzmann velocity distribution formula.
31. Write a note on Boson wave function and Fermion wave function.

(6 × 4 = 24 Marks)

SECTION – D

Answer any **two**; each carries **15** marks.

32. Discuss Bohr atom model, derive an expression for energy levels and explain hydrogen spectrum.
33. What is Compton effect? Explain its significance. Derive the expression for Compton effect.
34. What is photoelectric effect? Describe the laws of photoelectric effect. Derive Einstein's photoelectric equation.
35. Obtain the wavefunction and energy of a particle in a finite potential well.

(2 × 15 = 30 Marks)

(Pages : 3)

T – 1904

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Sixth Semester B.Sc. Degree Examination, April 2024
Career Related First Degree Programme under CBCSS
Group 2(a) – Physics and Computer Applications

Vocational Course

PC 1672 : OPERATING SYSTEMS

(2021 Admission)

Time : 3 Hours

Max. Marks : 80

SECTION – A

Answer all questions in **one** or **two** sentences.

1. What is compaction?
2. _____ is a fixed-length contiguous block of virtual memory.
3. What is dispatcher?
4. What is 50% rule?
5. What is a ready Queue?
6. Define throughput.
7. What do you mean by process scheduler?
8. Expand MAN.
9. What do you mean by CPU bound process?
10. Define dynamic loading.

(10 × 1 = 10 Marks)

P.T.O.

SECTION – B

Answer any **eight** questions, not exceeding a paragraph of **50** words.

11. Write note on indexed allocation of disc space.
12. Explain process synchronization.
13. Explain LRU page replacement algorithm.
14. What is real time operating system?
15. Elaborate the term logical address.
16. What is PCB?
17. Write the goal of parallelism.
18. Explain external fragmentation.
19. Write note on TLB.
20. Define semaphore.
21. How volume control block supports an OS?
22. Explain shortest job first process scheduling algorithm.

(8 × 2 = 16 Marks)

SECTION – C

Answer any **six** questions, in a page of **100** words.

23. Write note on deadlock prevention.
24. What are the four circumstances for CPU scheduling?
25. Write note on swapping.
26. Explain critical section problem.
27. Discuss the advantages of multiprocessor system.

28. Write a short note on interrupt.
29. Explain optimal page replacement algorithm with an example.
30. Explain the structure of page table in demand paging.
31. Write note on resource allocation graph.

(6 × 4 = 24 Marks)

SECTION – D

Answer any **two** questions, not exceeding **four** pages.

32. Explain process scheduling algorithms in detail.
33. Discuss in detail about demand paging.
34. Differentiate FCFS and SSTF disc scheduling algorithms with example.
35. Explain the advantages and challenges of distributed system.

(2 × 15 = 30 Marks)

(Pages : 3)

T – 1898

Reg. No. :

Name :

Sixth Semester B.Sc. Degree Examination, April 2024
Career Related First Degree Programme under CBCSS

Physics and Computer Applications

Elective Course

PC 1661.1 : ASTRONOMY AND ASTROPHYSICS

(2013 Admission Onwards)

Time : 3 Hours

Max. Marks : 80

SECTION – A

Answer **all** questions in **one** or **two** sentences.

1. Define constellation.
2. Write the four types of astrophysics.
3. Who is the father of modern astronomy?
4. How was astrology used in medieval times?
5. Name the two types of nebula.
6. How old is the microwave background radiation?
7. Define pulsar.
8. Why don't planets twinkle?

P.T.O.

9. What are the four seasons of the calendar?

10. Define rotation and revolution.

(10 × 1 = 10 Marks)

SECTION – B

Answer any **eight** questions.

11. List out the importance of astronomy.

12. Difference between astronomy and astrophysics.

13. What are the three reasons that astronomy was used by people in ancient times?

14. List out the properties of stars.

15. Differentiate lunar and solar eclipses.

16. What is Chandrasekhar limit?

17. Explain the significance of Hertzsprung - Russell diagram.

18. What is supernova and neutron stars?

19. How are comets formed in our solar system?

20. Write down the spectral classes of stars.

21. Difference between equinox and solstice.

22. **What causes the change in seasons on the earth?**

(8 × 2 = 16 Marks)

SECTION – C

Answer any **six** questions.

23. Explain the scope of astronomy.
24. Differentiate stellar magnitudes and apparent magnitudes.
25. State and explain Kepler's laws of planetary motion
26. Explain the modern astronomy.
27. Describe the Birth of the universe.
28. What is planets and satellites?
29. Write a short note on microwave background radiation.
30. Explain the motion of the earth.
31. Discuss the astronomical seasons and meteorological seasons.

(6 × 4 = 24 Marks)

SECTION – D

Answer any **two** questions.

32. Briefly discuss the history of
 - (a) Medieval astronomy and
 - (b) Renaissance Astronomy
33. (a) Briefly discuss the internal structure and physical properties of the sun.
(b) What is black holes? Explain the formation of black holes.
34. Give an account of the familiarization of milky way galaxy and the type of galaxies according to shape.
35. Explain the formation of planets. How the asteroids are formed? Compare the asteroids and meteorites.

(2 × 15 = 30 Marks)

(Pages : 3)

T – 1906

Reg. No. :

Name :

Sixth Semester B.Sc. Degree Examination, April 2024
Career Related First Degree Programme under CBCSS
Group 2(a) – Physics and Computer Applications
Core Course
PC 1671 : COMPUTER NETWORKS AND SECURITY
(2021 Admission)

Time : 3 Hours

Max. Marks : 80

SECTION – A

Answer **all** questions in **one** or **two** sentence.

1. What is cyber law?
2. Explain client- server model.
3. What is encryption?
4. In Cyber Security, Trojan horse is a _____.
5. _____ network is used to connect two locations together via a dedicated line.
6. Write note on switch.
7. What is brute force attack?
8. TDM stands for?
9. What is remote login?
10. Define bandwidth.

(10 × 1 = 10 Marks)

P.T.O.

SECTION – B

Answer **any eight** questions, not exceeding a paragraph of **50** words.

11. What do you mean by adaptive routing?
12. Write the role of firewall.
13. Describe 3G in network.
14. Define DNS.
15. Write the role of Hash Function in Cryptography.
16. What is Cypher Text?
17. Write note on VPN.
18. Describe the term 'Malware'.
19. Write note on MIME.
20. Explain Caesar cipher.
21. What is advantages of wireless transmission?
22. Write note on consumer protection act.

(8 × 2 = 16 Marks)

SECTION – C

Answer **any six** questions, in a page of 100 words.

23. Write use and applications of Computer Network.
24. Explain DES in detail.
25. Discuss CRC with suitable example.
26. Differentiate IPv4 and IPv6.

27. Elaborate distance vector Routing in detail.
28. Explain different switching techniques in detail.
29. What is hill cipher? Explain with an example.
30. Write note on sliding window protocol.
31. Explain multiplexing in detail.

(6 × 4 = 24 Marks)

SECTION – D

Answer any **two** questions not exceeding **four** pages.

32. Explain OSI model in detail.
33. Write detailed note on SSL.
34. Explain CSMA and CSMA/CD in detail.
35. What is digital signature? Explain its working.

(2 × 15 = 30 Marks)