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J – 2060

Reg. No. :

Name :

Sixth Semester B.Sc. Degree Examination, March 2020

Career Related First Degree Programme Under CBCSS

Physics with 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 in one or two sentences. **Each** question carries 1 mark.

1. Define microstate.
2. What is an ensemble?
3. What are Fermi particles?
4. What is a black body?
5. What is phase space?
6. State uncertainty principle.
7. Write down Schrodinger equation.

P.T.O.

8. What is an orbital?
9. Draw the diagram of Infinite Square well potential.
10. What is de-Broglie wave?

(10 × 1 = 10 Marks)

SECTION – B

Answer **any eight** questions not exceeding a paragraph. **Each** question carries **2** marks.

11. Explain photo electric effect.
12. Explain wave particle duality.
13. What are matter waves?
14. Explain Compton Effect.
15. What is probability normalisation?
16. Distinguish between position space and phase space.
17. What is meant by microstate and macrostate?
18. Explain Eigen functions and Eigen values
19. What are the limitations of Maxwell - Boltzmann statistics?
20. Derive Planck's radiation law.
21. Explain the postulates of equal a-priori of probability.
22. Explain Davisson Germer experiment. How it helped in explaining wave nature of particles.

(8 × 2 = 16 Marks)

SECTION – C

Answer any six questions. Each question carries 4 marks.

23. A piece of metal has a cut off wavelength of λ cutoff $f = 450$ nm. Consider illuminating this piece of metal with two different wavelengths of light: a $\lambda_1 = 500$ nm beam and a $\lambda_2 = 400$ nm beam. For each of the two beams, find the maximum kinetic energy of ejected electrons.
24. An electron, a proton, and a photon each have a wavelength of 0.24 nm. For each one, find the momentum and the energy.
25. What is the de Broglie wavelength of an electron that has 2.0 keV of kinetic energy?
26. Find the least energy of an electron moving in one dimensional infinite high potential of width 2 Angstrom.
27. Show that KE of an electron in a Bohr orbit is half of the magnitude of its total mechanical energy.
28. A light source of wavelength λ illuminates a metal and ejects photoelectrons with a maximum kinetic energy of 1.00 eV. A second light source with half the wavelength of the first ejects photoelectrons with a maximum kinetic energy of 4.00 eV. Determine the work function of the metal.
29. If the scattered X-rays are detected at 30° relative to the incident X rays, determine the Compton shift at this angle, the energy of the scattered X-ray, and the energy of the recoiling electron.
30. Derive the formula for Compton shift.
31. Calculate the most probable velocity of nitrogen molecules at room temperature.

(6 × 4 = 24 Marks)

SECTION – D

Answer any two questions. Each question carries 15 marks.

32. Apply Schrodinger equation and find the quantized energy states of
- (a) particle in infinite square well potential.
 - (b) one dimensional harmonic oscillator.
33. Explain in detail (a) Bohr atom model (b) Rutherford planetary model.
34. Explain in detail
- (a) Maxwell Boltzman statistics
 - (b) Bose Einstien statistics
 - (c) Fermi Dirac statistics
35. (a) Explain the three types of ensembles in detail.
- (b) What are the uses of ensembles?

(2 × 15 = 30 Marks)

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Career Related FDP Under CBCSS

Group 2 (b) — Computer Science/ Group 2 (a) Physics and Computer Applications

Core Course — CS 1641/Vocational Course PC 1671 : INTRODUCTION TO INFORMATION SECURITY

(2014 Admission onwards)

Time : 3 Hours

Max. Marks : 80

PART – A (Very Short Answer Type)

(One Word to maximum of one sentences. Answer **all** questions) :

1. Define Network Security.
2. Define decryption.
3. Define public key.
4. Expand DSS.
5. Expand IP.
6. Expand SSL.
7. Define anti virus.

8. What is spyware?
9. Define cipher.
10. What is a cyber crime?

(10 × 1 = 10 Marks)

PART – B (Short Answer)

Not to exceed one paragraph, Answer **any eight** questions. Each question carries 2 marks.

11. Write a note on confidentiality.
12. What is substitution ciphers?
13. What is encryption?
14. What is integrity?
15. Define message digest.
16. Explain about IPv4.
17. Explain about web security.
18. Explain about SSL session.
19. Define worms.
20. What is a spyware?
21. What is packet filters?
22. Write a note on Law of Convergence.

(8 × 2 = 16 Marks)

PART – C (Short Essay)

Not to exceed **120** words, Answer **any six** questions. Each question carries **4** marks.

23. Explain in detail about security policy.
24. Write in detail about substitution ciphers.
25. Write a detailed note on data encryption standards.
26. Explain about Public Key Cryptography.
27. Write a note on Email security.
28. Explain about SSL session and connection.
29. Explain working of anti-virus software.
30. Discuss characteristics of firewall.
31. Mention difference between IT act 2000 and 2008.

(6 × 4 = 24 Marks)

PART – D (Long Essay)

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

32. Explain in detail about RSA algorithm.
33. Write a detailed note on IP security.
34. Write about architecture of firewall.
35. Write a detailed note on IT regulations in India.

(2 × 15 = 30 Marks)

PCA

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Sixth Semester B.Sc. Degree Examination, March 2020

Career Related First Degree Programme Under CBCSS

Group 2 (a) Physics and Computer Applications

Elective Course

PC 1661.1 : ASTRONOMY AND ASTRO PHYSICS

(2013 Admission Onwards)

Time : 3 Hours

Max. Marks : 80

SECTION – A

Answer **all** questions in **one** or **two** sentences. Each question carries **1** mark.

1. Define Astronomical Unit (AU).
2. What is meant by the term 'retrograde'?
3. Which is our second nearest star and how much is the distance to the same?
4. The life time of a star depends on which physical quantity?
5. Name the currently used calender.
6. According to the Lambda CDM Model, what is considered as the origin of universe?
7. What is the main source of Sun's energy?

P.T.O.

8. Define luminosity of a star.
9. How much is the surface temperature of Sun'?
10. Who discovered the first Pulsar and when'?

(10 × 1 = 10 Marks)

SECTION – B

(Short answer type question)

Answer any **eight** questions. **Each** question carries **2** marks.

11. Which are the different branches of Astronomy?
12. What is International date line?
13. Define par sec. Also, give the relation between par sec and light year.
14. What is Chandrasekhar limit?
15. What is a nebula? Give one example.
16. Which are the three different zones of earth's interior?
17. What is meant by ecliptic?
18. Which are the colour indices of stars?
19. What is meant by Solar prominence?
20. Distinguish between the terms perihelion and aphelion.
21. Why do we have different seasons on earth?
22. What are the properties of corona?

(8 × 2 = 16 Marks)

SECTION – C

(Short essay problems)

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

23. When Sun becomes a black hole, how much will be its approximate radius?
24. What are considered as the components of the universe?
25. Briefly discuss about meteorites.
26. State Kepler's laws of planetary motion.
27. Given the luminosity and temperature, how is it possible to calculate the radius of a star?
28. What are comets and why do they form tails?
29. Distinguish between sidereal day and solar day.
30. If there exists a planet that goes around the Sun twice as fast as Earth, what would be its orbital size as compared to that of earth?
31. Which are the coordinates used in equatorial system?

(6 × 4 = 24 Marks)

SECTION – D

(Essay types questions)

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

32. Discuss the main features of Ptolemy's geocentric model of the Universe.
33. Describe the birth and evolution of a star.
34. Where is solar system located in Milkyway? Briefly describe the about the planets of solar system.
35. Define Galaxy. Describe the classification & morphology of galaxies.

(2 × 15 = 30 Marks)

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Sixth Semester B.Sc. Degree Examination, March 2020

Career Related FDP under CBCSS

Physics

Group 2(a) – Computer Applications

Vocational Course–XII

PC 1672 : COMPUTER NETWORKS

(2014 Admission Onwards)

Time : 3 Hours

Max. Marks : 80

SECTION – A

Answer **all** questions in **one** word to maximum of **two** sentences.

1. In link state routing, packets new routes are computed using _____ algorithm.
2. What type of errors can be detected by parity check code?
3. What are radio waves?
4. What is framing?
5. Define the term protocol.
6. _____ cables signal carry data signal in the form of light.

P.T.O.

7. How many layers are there in OSI reference Model?
8. Which layer is responsible for end to end data delivery?
9. What does Cname mean?
10. What is the header size of UDP packet?

(10 × 1 = 10 Marks)

SECTION – B

Answer **any eight** questions, from **12** of the following not exceeding one paragraph. Each question carries **2** marks.

11. What is FTP? Explain its use.
12. Explain the term fragmentation.
13. Write note on gateway.
14. What is half duplex data flow?
15. What services does the network layer provide?
16. What do you mean by noisy channel?
17. Draw a neat diagram of UDP packet format.
18. What is microwave?
19. Define computer networks.
20. Explain bit oriented framing.
21. What is a bridge? Explain its use.
22. What are the layers in TCP/IP Model?

(8 × 2 = 16 Marks)

SECTION – C

Answer **any six** questions not exceeding **120** words. Each question carries **4** marks.

23. Explain leaky bucket algorithm.
24. What is piggy backing?
25. Explain the term packet switching.
26. Explain different types of data flow in communication system.
27. Compare ISO/OSI Model and TCP/IP model.
28. What is flow control?
29. Explain stop and wait ARQ in detail.
30. Write note on Token ring.
31. Explain the difference between TCP and UDP.

(6 × 4 = 24 Marks)

SECTION – D

Answer **any two** questions not exceeding **4** pages. Each question carries **15** marks.

32. Explain link state routing with an example.
33. What is CSMA/CD? Explain briefly the working of CSMA/CD.
34. Explain CRC with an example.
35. Explain briefly about any four Transmission media.

(2 × 15 = 30 Marks)

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Sixth Semester B.Sc. Degree Examination, March 2020

Career Related First Degree Programme Under CBCSS

Physics With Computer Applications

Core Course

PC 1641: SOLID STATE PHYSICS

(2014 Admission onwards)

Time : 3 Hours

Max. Marks : 80

SECTION – A

Answer all questions. Each carries 1 marks

1. State Bragg's law
2. What is a unit cell?
3. What is rotational symmetry?
4. Give total number of atoms in the unit cell of FCC structure
5. What is a Bravais lattice?
6. Define dielectric constant.
7. What is meant by mean free path of free electrons in metal?
8. What is Fermi energy?

P.T.O.

9. How energy gap formed in superconductor?
10. What is the difference between antiferromagnetism and ferrimagnetism

SECTION – B

Answer any eight questions each carries 2 marks

11. State Dulong - Petit law.
12. Explain the origin of dipolar polarizability.
13. What are Cooper pair.
14. What is meant by Translational symmetry?
15. Why ionic bond is stronger compared to other bonds?
16. How temperature depends on critical field of superconductor?
17. What is Piezoelectricity? Explain how it is originated.
18. Explain the limitations of neutron diffraction
19. How Neutron diffraction differ from Electron diffraction.
20. Explain Diamond structure.
21. How to classify solids into metals, semiconductors, and Insulators according to their energy bands.
22. Explain magnetic susceptibility.

SECTION – C

Answer any six Questions each carries 4 Marks.

23. Explain Meissner effect. Show that superconducting state is perfectly diamagnetic
24. What is London penetration depth. How it depends on temperature?
25. Why Einstein model failed to explain heat capacity
26. Derive and explain Clausius-Mossotti relation.
27. Distinguish between Paramagnetism, Ferromagnetism.
28. Lattice constant of a cubic lattice is 5.41\AA . Calculate spacing between
 - (a) (011) planes
 - (b) (111) planes
29. Magnetic field strength in copper is 10^6 A/m. If magnetic susceptibility of copper is -0.7×10^{-5} calculate the flux density and magnetisation in Copper
30. Explain DC and AC Josephson effects
31. The critical temperature of lead is 7.18K and critical field at 0K is 6.5×10^{-4} A/m. Evaluate critical field at 4.2K.

SECTION – D

Answer any two questions each carries 15 Marks

32. State and explain Bragg's law. Discuss different experimental techniques using x ray diffraction

A beam of X rays incident on A sodium chloride crystal (lattice spacing 0.282 nm). First order Bragg reflection is observed at $8^\circ 35'$. What is the wavelength of X rays. At what angles second and third order reflections occur.

33. Explain heat capacity using free electron model and give expression for heat capacity. What are the drawbacks of this model. How Einstein model explain heat capacity. Derive expression for heat capacity using Einstein model.
 34. Discuss Hall effect and evaluate expression for Hall coefficient. Explain how Hall Effect can be used to find number and sign of charge carriers in a conductor.
 35. Point out differences between classical and quantum theories of paramagnetism. Evaluate equation for magnetisation considering Land'e factor.
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