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G – 1605

Reg. No. :

Name :

Sixth Semester B.Sc. Degree Examination, April 2019
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** the questions :

(10×1=10 Marks)

1. What is the nature of the particles which can be treated with B.E. Statistics ?
2. Why the photo electrons do not have as much energy as the quantum of light which causes its ejection ?
3. Give the characteristics of Black body radiation.
4. What do you mean by free particle and bound particle ?
5. What is degeneracy ?
6. Is M.B. – Statistics applicable to electron gas ?
7. Which Statistics is followed by the following particles ?
Electron, ideal gas molecules, proton, photon, helium atom, neutron, π meson, μ meson ?
8. Both photoelectric and Compton effects arise due to the action of photons on electrons, but the two effects are not the same. Explain this.
9. What do you understand by the terms Eigen value and Eigen function ?
10. State the correspondence principle.

P.T.O.



SECTION – B

Answer **any 8** questions :**(8×2=16 Marks)**

11. Explain Micro-Canonical ensemble.
12. Can a particle with zero energy exist in the box ? What is zero point energy ?
13. What are Micro and Macro States ?
14. What do you mean by Stationary States ?
15. Obtain the relation between entropy and thermodynamic probability.
16. Distinguish Canonical ensemble and grand canonical ensemble.
17. Explain normalization of wave function.
18. What are the basic differences between Wien's law and Reyleigh-Jeans law of blackbody radiation ?
19. Explain why an electron in Compton effect cannot be scattered at an angle greater than 90° .
20. Compare MB, BE and FD Statistics mentioning at least three characteristics.
21. State Bohr postulates.
22. Write the properties of a Wave function.

SECTION – C

Answer **any six** questions :**(6×4=24 Marks)**

23. The work function of a metal is 3.45 eV. Find the maximum wavelength of photon that can eject an electron from the metal.
24. The life time of a typical excited state of an atom is 1×10^{-8} sec. The atom emits a photon of wavelength 6000 \AA . What is the energy uncertainty of this photon ? What is the wavelength uncertainty of this photon ?
25. Obtain Schrodinger time dependent equation.

26. A particle trapped in one dimensional infinite potential well of width L is given by $\psi = A \sin\left(\frac{n\pi x}{2}\right)$ in the region : $\begin{cases} x > 0 \\ x < L \end{cases}$. Find the normalization constant A .
27. Find out the possible arrangements of two particles A and B in three cells according to MB-Statistics.
28. Estimate the maximum error in the determination of velocity of an electron if it is constrained to move in the X -direction and if its X -coordinate is known with an uncertainty of 10^{-6} m.
29. Obtain the energy of electron in a Bohr orbit.
30. The photoelectric threshold for a metal is 3000 \AA . Find the K.E of an electron ejected from it by radiation of wavelength 1200 \AA .
31. X-rays of wavelength 1.0 \AA are scattered from a carbon block. Find the wavelength of the scattered beam in a direction making 90° with the incident beam. What is the K-E of the recoiling electron ? Given $h = 6.63 \times 10^{-34} \text{ J-S}$, $e = 3 \times 10^8 \text{ m/sec}$. and $1 \text{ eV} = 1.6 \times 10^{-19} \text{ J}$.

SECTION – D

Answer any two questions :

(2x15=30 Marks)

32. Explain the phenomenon of BE – condensation and show graphically how the condensate fraction varies with temperature ?
33. What is photoelectric effect ? Give an account of Einstein's explanation of photoelectric effect on the basis of quantum theory.
34. Give an account of Heisenberg uncertainty principle. Outline an idealised experiment to bring out its significance.
35. Setup Schrodinger wave equation for a linear harmonic oscillator. Solve the equation and obtain its energy eigen values. Also deduce its zero point energy.
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Reg. No. :

Name :

Sixth Semester B.Sc. Degree Examination, April 2019
Career Related FDP Under CBCSS
Group 2(b) – Computer Science/Group 2(a) – Physics and Computer Applications
Core Course : CS – 1641/Vocational Course – XI : PC – 1671
INTRODUCTION TO INFORMATION SECURITY
(2014 Admission Onwards)

Time : 3 Hours

Max. Marks : 80

SECTION – A
(Very Short Answer Type)

One word to maximum of one sentences. Answer all questions. (10×1=10 Marks)

1. Define Information Security.
2. What you meant by cipher ?
3. What is DSS ?
4. What is message digest ?
5. Define Computer Virus.
6. List two characteristics of firewall.
7. What is cyber crime ?
8. Define law of convergence.
9. Define cryptography.
10. What are data encryption standards ?

P.T.O.



SECTION – B
[Short Answer]

Not to exceed one paragraph. Answer any eight questions. Each question carries two marks. (8×2=16 Marks)

11. Explain Public key cryptography.
12. What are the requirement of Network security ?
13. What is meant by key distribution ? Explain.
14. Explain different authentication method.
15. Write a note on IPV4.
16. What is SSL session ?
17. What are the limitation of firewall ?
18. What is copyright ?
19. What is malware ?
20. What do you mean by message digest ?
21. Why anti-virus are required ?
22. Why consumer right has to be protected ?

SECTION – C
[Short Essay]

Not exceeding 120 words, answer any six questions. Each question carries four marks. (6×4=24 Marks)

23. Explain about encryption based information security.
24. What is digital signature ? How it is implemented ?
25. State Indian Contract Act 1872.
26. Explain the working of Anti-Virus software.
27. Discuss IP Security Architecture.



28. Discuss the future trends in Security and cyber law.
29. Explain the working of MIME.
30. Discuss Indian Copyright Act.
31. Write a note on Trojan.

SECTION – D
[Long Essay]

Answer **any two** questions. **Each** question carry **15** marks. **(2×15=30 Marks)**

32. Explain in detail the concept of secured information transfer.
 33. Discuss in detail the digital signature algorithm for ensuring authenticity.
 34. Discuss the important characteristics of firewall ? Explain the firewall based system protection mechanism.
 35. Discuss the various regulations established by Govt. of India to prevent cyber crime.
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Reg. No. :

Name :

Sixth Semester B.Sc. Degree Examination, April 2019
Career Related FDP under CBCSS
Group 2(a) : PHYSICS AND COMPUTER APPLICATIONS
Vocational Course
PC 1672
Computer Networks
(2014 Admission Onwards)

Time : 3 Hours

Total Marks : 80

PART – A

(Very Short Answer Questions)

Answer **all** questions. Each question carries 1 mark.

1. Define computer networks.
2. Expand the term IEEE.
3. What do you mean by a switch ?
4. What is piggybacking ?
5. What is an interfacing device ?
6. What do you mean by congestion ?
7. What is a hub ?
8. Name any two wired transmission media.
9. Define the term fragmentation.
10. Define the term hamming distance.

(10×1=10 Marks)

P.T.O.



PART – B

(Brief Answer Questions)

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

11. What are two types of network connections ?
12. Define bandwidth and baud rate.
13. What is the use of parity bit ?
14. Write how framing can be done by data link layer.
15. Explain the use of gateways.
16. What do you mean by logical address of a network ?
17. Write frame format of UDP protocol.
18. Explain the cross section of a fibre optic cable.
19. Write reasons on need of various layers in network models.
20. What is flow control ?
21. Explain flow control methods in noiseless channels.
22. What is a datagram ?

(8×2=16 Marks)

PART – C

(Short Essay Type Questions)

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

23. Discuss simplex, half duplex and full duplex transmission.
24. Explain leaky bucket algorithm in detail.
25. Explain briefly CRC algorithm.



26. Explain DNS in detail.
27. What is use of bridge ?
28. Explain various switching techniques.
29. Write a note on token bus standard.
30. Write a note on stop and wait ARQ.
31. Compare ALOHA and slotted ALOHA protocol. **(6×4=24 Marks)**

PART – D
(Long Essay)

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

32. Explain functionality of various layers of ISO OSI reference model.
 33. Explain various types of unguided transmission media.
 34. Explain briefly distance vector routing and link state routing techniques.
 35. Write short note on :
 - A) TCP.
 - B) FTP.**(2×15=30 Marks)**
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G – 1591

Reg. No. :

Name :

Sixth Semester B.Sc. Degree Examination, April 2019
Career Related First Degree Programme Under CBCSS
Physics with Computer Applications
Core Course – IX
PC 1641 : SOLID STATE PHYSICS
(2014 Admission Onwards)

Time : 3 Hours

Max. Marks : 80

SECTION – A

Answer **all** questions.

(10×1=10 Marks)

1. What are Miller indices ?
2. State Debye's T^3 Law.
3. What is Josephson effect ?
4. State Bloch theorem.
5. What is meant by Brillouin Zone ?
6. What is covalent bond ? Give an example.
7. What are the information about the crystals revealed by the X-ray diffraction studies ?
8. Define crystal lattice.
9. What are diamagnetic materials ?
10. Define pair distribution function.

P.T.O.



SECTION – B

Answer **any 8** questions.

(8x2=16 Marks)

11. What are Bravais lattices ? Name them.
12. Explain Laue method in X-ray diffraction studies.
13. What is the advantage of neutron diffraction over electron diffraction ?
14. Differentiate paramagnetism and ferromagnetism.
15. What is Piezoelectricity ? How does it arise ?
16. Describe diamond structure.
17. Explain various symmetry elements associated with a crystal.
18. What are metallic bond ? Give its properties.
19. Explain critical field.
20. Draw the plot for the four types of polarization at different frequency range.
21. Explain electrical conductivity in free electron theory.
22. How the X-rays are generated ?

SECTION – C

Answer **any six** questions.

(6x4=24 Marks)

23. Copper has fcc structure and the atomic radius is 0.1278 nm. Calculate the interplanar spacing for (110) and (212) planes.
24. A beam of X-rays of wavelength 0.071 nm is diffracted by (110) plane of rock salt with lattice constant 0.28 nm. Find the glancing angle for the second order diffraction.
25. A paramagnetic material has 10^{28} atoms per m^3 . Its susceptibility at 350 K is 2.8×10^{-4} . Calculate the susceptibility at 300 K.
26. A super conducting tin has a critical temperature of 3.7 K at zero magnetic field and a critical field of 0.0306 Tesla at 0 K. Find the critical field at 2 K.



27. In an orthorhombic crystal a plane makes intercepts 2.93, 4.47 and 2.35 mm along the three crystallographic axes, the corresponding primitives being 3.05, 6.99 and 4.90 Å. Deduce the Miller indices of the cleavage plane.
28. A solid dielectric has electronic polarizability of 10^{-40} Fm². If the internal electric field be a Lorentz field, what is the dielectric constant of the material. (Given density = 3×10^{28} atoms/m³).
29. The magnetic field strength of a piece of metal is 10^6 A/m. Calculate the magnetization and flux density of the material. $\chi = 1.5 \times 10^{-3}$.
30. A current of 10 mA flows through an n-type Ge strip of 1 mm thick and 1 mm wide placed in a magnetic field B. If the Hall Voltage produced inside the strip be 1 mV, what is the value of B ? Given $R_H = 10^{-2}$ m³/coulomb.
31. A uniform silver wire has a resistivity of 1.54×10^{-8} $\mu\Omega$ at room temperature. For an electric field along the wire of 1 volt/cm, compute the average drift velocity of the electrons, assuming that there are 5.8×10^{28} conduction electrons/m³. Also calculate the mobility and the relaxation time of the electron.

SECTION – D

Answer **any two** questions.

(2×15=30 Marks)

32. Describe the Hall effect. Show that the Hall coefficient is equal to $\frac{1}{ne}$. Give importance of the Hall effect.
 33. Derive an expression for the specific heat of solids following the Einstein model. Discuss its agreement with experimental results at various temperature ranges.
 34. Describe the Langevin theory diamagnetism.
 35. i) Explain Type I and Type II superconductors.
ii) Briefly discuss BCS theory.
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