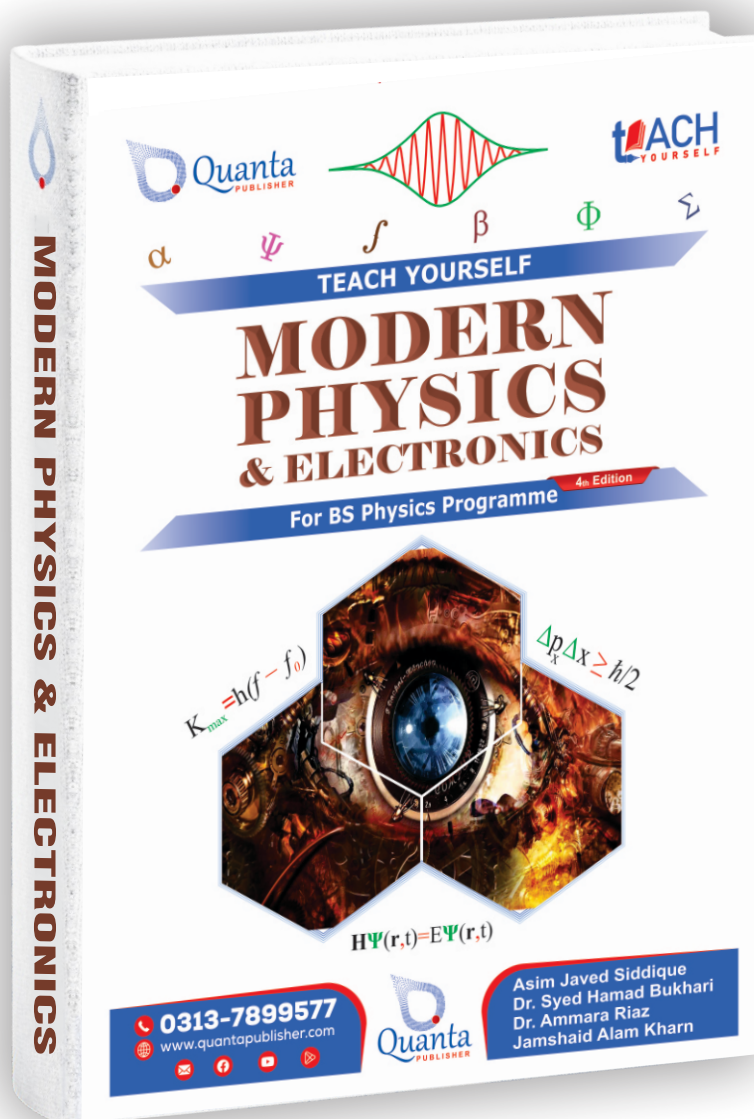




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UNIVERSITY OF THE PUNJAB

Roll No.

Third Semester 2018
Examination: B.S. 4 Years ProgrammePAPER: Concepts of Modern Physics
Course Code: PHY-201/21330TIME ALLOWED: 30 mins.
MAX. MARKS: 10*Attempt this Paper on this Question Sheet only.***OBJECTIVE PART**

- Q.1 Encircle the correct answer from given multiple choices in each part. (1 x 10)
- A) According to quantum physics, the energy of an atomic oscillator is
i) Constant ii) Continuous iii) Discrete iv) None of these
- B) What is the effect of the increasing the intensity of light in photoelectric effect
i) The KE of photoelectrons increases ii) The Stopping potential increases
iii) Cutoff frequency increases iv) Emission of photo electrons increases
- C) Series that lies in visible region of hydrogen spectrum is called
i) Lyman series ii) Balmer series iii) Bracket series iv) Paschen series
- D) The magnitude of the minimum momentum of a particle, trapped in infinite potential well of width L will be
i) 0 ii) $h^2/2L$ iii) $h^2/2L^2$ iv) $h/2L$
- E) Space quantization in magnetic field was experimentally verified by
i) Zeeman and Lyman ii) Einstein and de Hass iii) Stern and Gerlach
iv) Pauli and Bohr
- F) X-rays are produced through
i) Bremsstrahlung processes ii) K-shell emission processes
iii) Radioactive decay iv) Both Bremsstrahlung and K-shell emission
- G) The density of charge carriers in pure silicon at room temperature is of the order of
i) 10^{28} m^{-3} ii) 10^{16} m^{-3} iii) 10^{22} m^{-3} iv) None of these
- H) When forward biased is increased across the PN diode, the depletion region
i) Increases ii) Decreases iii) Remains unchanged iv) None of these
- I) The activity or rate of decay of a radioactive source is measured in
i) Rad ii) Rem iii) Curie iv) Roentgen
- J) The emission of a beta particle from a nucleus results in
i) Decrease in the atomic mass number ii) Increase in the atomic mass number
iii) No change in the atomic mass number iv) None of these



UNIVERSITY OF THE PUNJAB

Third Semester 2018

Examination: B.S. 4 Years Programme

Roll No.

PAPER: Concepts of Modern Physics
Course Code: PHY-201/21330

TIME ALLOWED: 2 hrs. & 30 mins.
MAX. MARKS: 50

Attempt this Paper on Separate Answer Sheet provided.

SUBJECTIVE PART

Note: Attempt all questions of this section.

- Q.2** Give the short answer of each question (2 x 10 = 20)
- i. Explain thermal radiation.
 - ii. Explain the energy of oscillator by classical physics and quantum physics
 - iii. Briefly describe Wien's displacement law.
 - iv. Explain briefly the Einstein's photoelectric effect equation.
 - v. Describe briefly, how Continuous X-ray spectrum is produced.
 - vi. Why population inversion is necessary between two atomic levels for laser action to occur?
 - vii. Explain semiconductors, according to band theory of solids.
 - viii. Explain biasing rule for normal operation of NPN transistor.
 - ix. Describe the difficulties in operation of thermonuclear fusion reactor.
 - x. Give the difference between exothermic and endothermic reaction.
- Q.3** (a) Define de-Broglie's hypothesis. Explain in detail, how Davisson-Germer proved de Broglie's hypothesis. (1,6)
- (b) Calculate the de-Broglie's wavelength of a particle of mass 1.0×10^{-15} kg moving at a speed of 2.0 m/s. (3)
- Q.4** (a) State Bohr's postulates. Using Bohr's model of hydrogen atom, derive the expression for total mechanical energy of electron orbiting about central proton. (2, 5)
- (b) Calculate the binding energy of a hydrogen atom, that is, the energy that must be added to the atom to remove the electron from its lowest energy state. The values to be used; $h=6.63 \times 10^{-34}$ j.s, $R=1.097 \times 10^7 \text{ m}^{-1}$, $C=3 \times 10^8$ m/s. (3)
- Q.5** (a) What is fission chain reaction? Discuss the three problems together with their solutions in working of nuclear reactor based on fission chain reaction. (1, 6)
- (b) Consider a ^{236}U nucleus is in its ground state. How much energy is required to remove a neutron from it, leaving a ^{235}U nucleus behind? The needed atomic masses are $^{235}\text{U}=235.043924$ u; $n = 1.008665$ u; $^{236}\text{U}= 236.045563$ u. (3)



UNIVERSITY OF THE PUNJAB

Fourth Semester - 2018
Examination: B.S. 4 Years

Roll No.

PAPER: Physics-IV (Concepts of Modern Physics)
Course Code: PHY-213 / PHY-22307 Part - I (Compulsory)

TIME ALLOWED: 15 Min.
MAX. MARKS: 10

Attempt this Paper on this Question Sheet only.

Please encircle the correct option. Each MCQ carries 1 Mark. This Paper will be collected back after expiry of time limit mentioned above.

Question no: 1

(10x1=10)

Attempt all MCQs and chose the best answer.

1. Frequency below which no electrons are emitted from metal surface is
 - a) minimum frequency
 - b) angular frequency
 - c) maximum frequency
 - d) threshold frequency
2. Energy absorbed by electron is used in
 - a) escaping the metal
 - b) increasing kinetic energy
 - c) both A and B
 - d) increasing frequency
3. Microwaves have wavelength of about
 - a) 10 cm
 - b) 20 cm
 - c) 30 cm
 - d) 40 cm
4. Our eyes detect light in
 - a) RGB form, Red Blue Green form
 - b) ROYGBIV, rainbow color form
 - c) The simple form of a particular color
 - d) none of these ways
5. Moon is a good example of
 - a) Luminous objects
 - b) Non-luminous objects
 - c) Transparent objects
 - d) Opaque objects
6. Temperature of a gas is increased, its kinetic energy would
 - a) increase
 - b) decrease
 - c) remain same
 - d) increase and decrease both

7. Effect of diffraction is greatest if waves pass through a gap with width equal to
- frequency
 - wavelength
 - amplitude
 - wavefront
8. Visible light has wavelength of
- 5×10^{-7} m
 - 3×10^8 m
 - 6×10^3 m
 - 4×10^4 m
9. Spreading of wave as it passes through a gap or around an edge is called
- reflection
 - refraction
 - diffraction
 - superposition
10. In photoelectric effect, electrons should be removed from the
- inner shells
 - surface
 - from core
 - the nucleus



UNIVERSITY OF THE PUNJAB

Fourth Semester - 2018
 Examination: B.S. 4 Years

Roll No.

PAPER: Physics-IV (Concepts of Modern Physics)
 Course Code: PHY-213 / PHY-22307 Part – II

TIME ALLOWED: 2 Hrs. & 45 Min.
 MAX. MARKS: 50

Attempt this Paper on Separate Answer Sheet provided.

Question no: 2

Write short answers of the following questions. (4 x 5 = 20)

- Define Planks distribution law and Wien displacement law?
- Describe the working of Nuclear Reactor?
- Define Spectroscopy. Name three types of spectra?
- Define azimuthal quantum number in detail?
- State any 2 theorems associated with wave-functions in Quantum Mechanics?

Question no: 3

(10)

What do you know about Lorentz Transformation? Define Relativistic momentum in this regard?

Question no: 4

(10)

Describe the process of Controlled Thermo-Nuclear Fusion in detail?

Question no: 5

(10)

Describe the theory of Beta-Decay in detail? Also calculate its penetration depth?

Program: BS-4 Years in Chemistry Course Code: PHYS-206 Free Copy
 Program Name in which this course is common Bs Physics, Bs Mathematics/ Chemistry
 Course Title: Electronics and Modern Physics BS-247-16
 Session: 2016 -2020 Semester 4th Final Time Allowed 02:00 hrs Max. Marks 50

Q.No.	Questions	Marks
1.	Encircle the best option under each.	(8x1=8)
	1. Which one of these is Acceptor Atom? (a) B (b) P (c) Sb (d) As 2. A logic Gate in which an output is low only when both inputs are identical (a) OR Gate (b) AND Gate (c) X-OR Gate (d) X-NOR Gate 3. Exchange of energy Between radiations and material of a cavity is not continuous in (a) Wien's Law (b) Planck's Law (c) Stefan's Law (d) Rayleigh's Law 4. If $n=4$ then the possible values of m_l are (a) 5 (b) 7 (c) 8 (d) 2 5. The relation for energy of Photon is... (a) $E = h \lambda / c$ (b) $E = h / f$ (c) $E = f / h$ (d) $E = hc / \lambda$ 6. A transistor is used as (a) Amplifier (b) Rectifier (c) Oscillator (d) Both a, and c 7. Which is called an inverte? (a) OR Gate (b) AND Gate (c) NOT Gate (d) NANAD Gate 8. Wave -like nature of mater was verified by (a) frank Hertz experiment (b) GP Thomson experiment (c) Stern Gerlach experiment (d) Rutherford experiment	
Q.2:	Write short answer of the following.	(2x10=20)
	1. Do pure semiconductors obey Ohm's Law? 2. Why a diode is used as a rectifier? 3. Draw schematic symbol of X-NOR Gate. 4. What do you means by a negative feedback? 5. State Stefan -boltz mann's Law 6. Give postulates of Bohrs theory about Hydrogen Atom. 7. How De Broglie interpreted about Bohrs orbit? Explain it. 8. Give an idea about Pauli Exclusion Principle. 9. How Moseley Explained X -Ray Spectrum? Explain Briefly. 10. Derive Wien's Law from Planck's radiation Law	
LONG QUESTIONS		7+7+8=22
Q.3:	(a) State De Broglie s Hypothesis. How can you verify this hypothesis by Davisson and Germer experiment? Explain it in detail. (b) In a Junction transistor, $I_E = 5.82\text{mA}$ and $I_B = 120\mu\text{A}$, calculate I_C	5+2=7
Q.4:	(a) What do you mean by the Compton s effect? How can you Explain this effect on the basic of Quantitative analysis to derive an expression for Compton s shift? (b) What is frequency of an X- ray Photon whose momentum is $1.1 \times 10^{-23} \text{ kgm}^2 \text{ sec}^{-1}$?	7
Q.5	(a) What is magnetic moment? Derive an expression for Bohr magneton. (b) What do you mean by Extrinsic semiconductors? Explain P-type semiconductors	5+3=8

BS-247-16-20-200.

Program: BS-4 Year in PHYSICS


Course Code: PHYS 208

Course Title: Electronics and Modern Physics

Session: 2017 - 2021 Semester 4TH Time Allowed 2 hrs Max. Marks 60

Q.No.	Questions	Marks
Q.No.1	<p>(a) Select the correct answer.</p> <p>i. Semi conductor PN-junction is (a) Rectifier (b) Transistor (c) Diode (d) None</p> <p>ii. Diode which gives visible light when forward biased is called i. Zener Diode (b) LCD (c) Photo diode (d) LED</p> <p>iii. Power output in full wave rectifier than half wave rectifier is (a) Same (b) Half (c) Double (d) None</p> <p>iv. In negative feedback the phase difference between input and out put is (a) 0° (b) 90° (c) 180° (d) 360°</p> <p>v. if base current is very small then $I_c =$ ____ (a) I_e (b) I_b (c) zero (d) infinite</p> <p>vi. The current gain is given by (a) $\Delta I_c / \Delta I_b$ (b) $\Delta I_c / \Delta I_e$ (c) $\Delta I_c / \Delta I_b$ (d) None</p> <p>vii. The electronic device that convert AC in DC is called. (a) Oscillator (b) Amplifier (c) Rectifier (d) All</p> <p>viii. Unit of RC is same as that of (a) Energy (b) Time (c) Power (d) None</p> <p>ix. There is a wide energy gap between valance and conduction band is ____ (a) semiconductor (b) conductor (c) insulator (d) metal</p> <p>x. Panchen series of hydrogen spectra lies in ____ region. (a) Visible (b) IR (c) UV (d) far IR</p>	10
Q.No.2	<p>Write the short answer to the following questions.</p> <p>ii. Differentiate between insulator, semiconductor and insulator with the help of energy band diagram.</p> <p>iii. What is the intrinsic semiconductor?</p> <p>iv. Why silicon is widely used in semiconductors?</p> <p>v. What is load line?</p> <p>vi. Write the three configuration of a transistor with diagram.</p> <p>vii. What does light behaves as a particle and when does it wave?</p> <p>viii. Can hydrogen atom be caused to emit X-ray? If so, describe how? If not, explain it. ?</p> <p>ix. What will be the angle of scattering to get maximum Compton shift?</p> <p>x. What is stopping potential in Photoelectric effect?</p>	2×10=20
Q.No.3	<p>a) Describe the Davison and Germer experiment to verify de-Broglie hypothesis about the dual nature of radiation and matter.</p> <p>b) Discuss Bohr's theory of postulates, find the value of Bohr's radius and the total energy of the electron</p> <p>c) Explain the Photoelectric effect.</p> <p>d) What are X-rays? Differentiate between k_α and k_β radiations.</p>	08 08 08 06

BS-411-17-21-200.

 **GOVERNMENT COLLEGE UNIVERSITY, FAISALABAD**
Affiliated Colleges Semester Examinations

Roll No. _____

BS Programme
Course Code: PHY-403
Time Allowed: 1:40 Hrs

Semester: III, BS Physics
Course Title: Modern Physics -I
Max. Marks: 36 Cr. Hr. 3(3-0)

Fall-2018-19

SUBJECTIVE

Attempt All Questions.

Q. No. 2: (a) Describe the Davison-Germer experimental evidence for the existence of de-Broglie wavelength with moving objects. (5)

(b) The wavelength of yellow spectral emission lines of sodium is 589 nm. At what kinetic energy would an electron have the same De-Broglie wavelength. (3)

Q. No. 3: (a) Describe LASER principle, working and properties of laser light (5)

(b) Calculate the ground state energy of electron in the hydrogen atom (2)

Q. No. 4: (a) Explain the phenomenon of Nuclear fission in detail (5)

(b) What are the units used for measuring ionizing radiation? (2)



UNIVERSITY OF THE PUNJAB
B.S. 4 Years Program / Fourth Semester – 2019

Roll No.

Paper: Physics-IV (Concepts of Modern Physics)
Course Code: PHY-213 / PHY-22307 Part – II

Time: 2 Hrs. 45 Min. Marks: 50

ATTEMPT THIS (SUBJECTIVE) ON THE SEPARATE ANSWER SHEET PROVIDED

Q.2. Give short answers to the following. (4x5=20)

1. What is blackbody radiation? Write down Rayleigh's law and Planck's law for energy density and explain the difference between them. What is ultraviolet catastrophe?
2. The kinetic energies of photoelectrons range from zero to $4.0 \times 10^{-19} J$ when light of wavelength 3000 \AA falls on a surface. What is the stopping potential for this light?
3. Determine the maximum scattering angle in a Compton experiment for which the scattered photon can produce a positron-electron pair.
4. Calculate the kinetic energy of a neutron whose de Broglie wavelength is 0.7 \AA .

Q.3. Give long answers to the following. (3x10=30)

1. (a) Find the energies of two photons that are produced when annihilation occurs between an electron and positron that are initially at rest.
(b) Determine a photon's threshold energy for pair production.

(5+5)

2. Discuss in detail the stability of nuclei.

(10)

3. State and explain de Broglie hypothesis. State properties of matter waves.

(10)

GOVERNMENT COLLEGE UNIVERSITY
FAISALABAD



Discipline: BS- Physics

(4th Semester)

Time: 90 minutes

Total Marks 75(50+25)

Course Title: Modern Physics II

Course Code: PHY-404

Credit Hours: 3(3-0)

Final term Spring 2020)

ROLL NO: _____

Signature _____

Q. Choose The Correct Answer

50=1x50

50 = 1x50

Sr. NO	Statement	A	B	C	D
1	For S orbital l=	1	0	2	3
2	Ellipse has axis	1	2	3	4
3	The degenerate orbitals in p state	1	2	3	4
4	When alpha particle is emitted ,atomic no decrease by	1	2	3	4
5	Atomic no increase by,when beta particle is emitted	1	2	3	4
6	Atomic no changes,when gama particle is emitted	1	0	2	3
7	Value of orbital quantum no l starts from	1	0	2	3
8	The no of neutron in He ⁴	2	1	5	3
9	For d-shell l=2,the No .of Zeeman splits	3	5	7	9
10	For j=2, m _j have values	3	5	1	4
11	Frank Hertz experiment was performed in	1918	1914	1920	1910
12	Rotational k.E	1/2 Iw ²	(1/2)Iw	Iw	None
13	For p orbital l=1, S=1/2, j=	1/2,3/2	1/2,1/2	1/2,5/2	3/2,3/2
14	In Meta state electron stay	10 ³ s	10 ⁻³ s	10 ⁸ s	10 ⁻⁸ s
15	1 Mev=	10 ⁵ ev	10 ⁶ ev	10 ³ ev	10 ⁻⁶ ev
16	The energy of electron in hydrogen atom in ground state	-13.6ev	13.6ev	10.4ev	1.4ev
17	The magnetic quantum no can have values	2(2l+1)	2l+1	2l-1	2(2l-1)
18	In Neon ,meta state has energy	22.61ev	20.66ev	20.61ev	None of these
19	Multiplicity	2S+1	2S+2	2S+3	2S+4
20	The 1st Excitation Potential of mercury	4.9V	9.8V	10.4V	1.4V
21	Summerfeld model ,orbit	cicular	eliptical	linear	cylindrical
22	Linear Molecule	CO	H ₂	CO ₂	All of these
23	Hydrogen atom does not emit x-rays	Energy levels are too close	Energy levels are too apart	It is too small in size	It has single electron
24	Black Body Is	Ideal absorber	Ideal emitter	Both a&b	None of these
25	X-ray Wavelength decreases if voltage	Increases	Decreases	Constant	None of these
26	Population density in a system	Increases	decreases	constant	None of these
27	rest mass of photon	Infinite	zero	small	1,67x10 ⁻²⁷ kg
28	NaCl	Ionic Bond	Covalent Bond	Polar Bond	None
29	Nuclei with same A but different Z	Isotopes	Isobars	Isitones	Isomers
30	SI unit of Planks contant	Joule-sec	Watt-sec	Newton-sec	None of these
31	Unit of Intensity	m/watt	Watt/m ²	watt	None of these
32	Laser Operation depend on	Meta state existence	Population Inversion	Both a&b	None of these
33	Moment of Inertia	Mr ²	mr	M2r	2mr

34	Characteristics x-ray depend on	Nature of target	Potential difference applied	Filament	None of these
35	In He-Ne Laser action is produced by	Ne	He	Both a&b	None
36	In Frank Hertz experiment, Grid potential	Negative	positive	zero	None of These
37	Zeeman effect without spin	Normal Zeeman effect	Anomalous Zeeman effect	Photoelectric effect	Compton effect
38	The energy of bond electron	positive	Negative	Zero	None of these
39	Magnetic force	$q(\mathbf{V} \times \mathbf{B})$	$\mathbf{B}(q\mathbf{x}\mathbf{V})$	$\mathbf{V}(q\mathbf{x}\mathbf{B})$	none
40	Photon of high energy	Red colour	Green color	Violet colour	Blue colour
41	Which orbital has Dumbbell shape	S orbital	P orbital	D orbital	F orbital
42	If $2S+1=1$	singlet	Doublet	Triplet	None of these
43	L-L coupling is useful for	Small Z	Large Z	Z	None of these
44	The Stern Gerlach Experiment confirms Quantization of electron	Spin	Angular Momentum	Energy	None
45	The Einstein coefficient A is related to rate of	Spontaneous emission	Stimulated emission	Continuous emission	None of these
46	According to Stefan Boltzman Law Intensity is proportional to	T^2	T^3	T^4	T^5
47	In Stern Gerlach experiment Magnetic field	Uniform	Non uniform	No field	None of these
48	Bohr theory is unable explain	Zeeman effect	Multi electron	Fine structure	All of these
49	Splitting of spectral lines is greater in	Zeeman effect	Anomalous Zeeman effect	Stark effect	None of these
50	Splitting of spectral lines by electric field	Zeeman effect	Stark effect	Compton effect	None

Short Questions

Marks:-25

Time:-50 minutes

Q.1. Define Orbital quantum Number.

Q.2. Differentiate between Characteristics X-rays and Continuous X-rays.

Q.3. Describe He-Ne Laser.

Q.4. What is Ionic bond and Covalent Bond?

Q.5. What is Zeeman effect?

Govt. Postgraduate College of Science, Faisalabad.

Bs-Physics 3rd Semester M/E

Mid term examination

Course code:-phy -403

Time:- 50minutes

Course title:- Modern physics I

Marks:-08

(Subjective)

Note:-Attempt all question

Q.1.(a) State Wien displacement Law

(1)

(b) Calculate the wavelength of maximum spectral radiancy for the sun

With surface temperature of 5800k.

(3)

Q.2. What is Photo electric effect? Explain this effect using photon theory

And derive Enstein photo electric equation.

(4)

B.S. 4 Years Program / Fourth Semester – Spring 2022
 Paper: Modern Physics Course Code: PHYS-2002

Roll No. [REDACTED]

Time: 3 Hrs. Marks: 60

THE ANSWERS MUST BE ATTEMPTED ON THE ANSWER SHEET PROVIDED

Q.1. Briefly describe the following.

(15x2=30)

- i. Write down the postulates of special theory of Relativity.
- ii. Define the term population inversion. Why population inversion is necessary between two atomic levels for laser action to occur?
- iii. What is q-value of nuclear reaction? How does its positive or negative value effect the nuclear reaction?
- iv. Explain insulators, according to band theory of solids.
- v. Find the energy released during the alpha decay of ^{238}U . The needed atomic masses are $^{38}\text{U} = 238.050785 \text{ u}$; $^{234}\text{Th} = 234.043593 \text{ u}$; $^4\text{He} = 4.002603 \text{ u}$;
- vi. What is relativistic momentum? Give its relation.
- vii. Define cooper pair.
- viii. What is inverse beta decay?
- ix. Mention four characteristics of laser.
- x. Differentiate between boson and fermions.
- xi. Write down the general nuclear reaction showing how atomic and mass number of an atom is affected with the emission of gamma radiation.
- xii. Differentiate between absorption and emission spectrum with the aid of diagram.
- xiii. Write down the Maxwell Boltzmann distribution function.
- xiv. Why does the classical theory fail to explain specific heat of solids?
- xv. What is the purpose of moderator in nuclear reactor?

Answer the following questions

(3x10=30)

- Q2. Write down Planck's law for energy density. Why is it superior to Rayleigh's law?
- Q3. State Bohr's postulates. Using Bohr's model of hydrogen atom, derive the expression for total mechanical energy of electron orbiting about central proton. Show that the electronic energy states are discrete
- Q4. What are semiconductors? How N-type/P-type semiconductor is formed? Describe the formation of depletion region in a junction diode? Can we control the width of depletion region?