The National College

(Autonomous),

Jayanagar, Bangalore.

Institutional Distinctiveness

The motto of the National College reflects the laudable principle of the instituition. It speaks volumes about the goal of the institution that aims at creating a centre of academic excellence. We, at National College, Jayanagar have been trying to adopt Outcome-based methods in the teaching-learning and evaluation process to check whether each student has achieved the specified outcomes by the end of the educational experience. The focus on outcomes creates a clear expectation of what needs to be accomplished by the end of the year of the course. So that the faculty will be able to structure their lessons according to the students' needs. Hence, the IQAC of the college has organised Workshops in view of training the faculty to make their teaching very effective.

A Workshop on Outcome Based Education was organized by the IQAC of National College on 16th April, 2021 at 10:30 AM in Multimedia Hall. Dr. Chandrashekar and Dr. Vishal, Associate Professors from the Department of Master of Computer Applications of R.V. College of Engineering, Bangalore were the resource persons.

In Continuation with the Workshop on Outcome Based Education held on 16th April, 2021, the departments of English, Kannada, History and Commerce were asked to map the question papers with Course Objectives and present the same in Multimedia Hall on 7th August, 2021 from 1PM to 2PM. The workshop was organized to enrich the faculty members with Outcome Based Education and it was very interactive with the active participation of all the other departments of National College, Jayanagar, Bangalore.

The National College

(Autonomous)

Jayanagar, Bangalore

Department of Post Graduate Studies and Research in Physics

INDIVIDUAL COURSE OUTCOME (CO) and BLOOMS TAXONOMY (BLT)

MSc PHYSICS - 3rd Semester

CO Levels

Level 1		**Level 2**		**Level 3**	
Describe/Identify	List	Explain	Predict	Compute	Illustrate
Name/Recognise	What/Where	Compare	Distinguish	Use/Deduce	Classify/Categorize
Find	Write/Draw	Discuss	Summarize	Draw	Solve
Level 4		**Level 5**		**Level 6**	
Characterize	Identify	Justify	Recommend/Interpret	Formulate	Design/Develop
Examine	Organise	Estimate	Evaluate /Calculate	Invent	Construct
Derive	Investigate	Prioritise	Decide/Choose	Compose	Predict

BTL levels

Blooms Taxonomy	**Levels**
Level 1 & Level 2	Low (L)
Level 3 & Level 4	Medium (M)
Level 5 & Level 6	High (H)

P301: Condensed Matter Physics

SI. NO.	Question	CO	Marks	BTL
1	What is the structure factor Explain?	L1	5	L
2	Explain Wiedemann Franz law and its limitations.	L2	5	L
3	Explain mobility of charge carriers in intrinsic semiconductor.	L2	5	L
4	Explain persistent currents in superconductors and mention few applications of superconductors.	L2	5	L
5	Explain polar and non-polar dielectrics.	L2	5	L
6	Distinguish between ferromagnetism and antiferromagnetism.	L2	5	L
7	Deduce an expression for reciprocal lattice for Body centered cubic (BCC) and Face centered cubic (FCC) crystal.	L3	10	M
8	Derive an expression for electron in 1D period square well potential using Kronig Penny Model.	L4	10	M
9	Derive an expression for carrier concentration for electron in intrinsic semiconductor	L4	10	M
10	Discuss BCS theory of superconductors in detail.	L2	10	L
11	Derive an expression for the Lorentz field for linear array of atoms in an electric field.	L4	10	M
12	What is paramagnetism? Describe Langevin theory of paramagnetism. Obtain an expression for magnetic susceptibility employing classical theory.	L4	10	M
13	Assuming the lattice points of the lattice parameter ‘a’ in a bcc structure are occupied by spherical atoms of radius ‘r’. Calculate (i) the free volume per unit cell (ii) determine the radii of the largest sphere that will fit into the voids produced by the lattice point atoms not occupying in the full volume of the cell.	L5	5	H
14	The density of silver is 10.5×10^{3} kg/m^{3}. The atomic weight of silver is 107.9. Assuming that each silver atoms provides one conduction electron, calculate the density of electrons. The conductivity of silver at 20˚C is 6.8×10^{7} Ωm^{-1}. Calculate the mobility of electrons in silver.	L5	5	H
15	A copper wire has a resistivity of 1.8×10^{-8} Ωm at room temperature (300K). Assuming copper is very pure, estimate the resistivity at 700˚C and the percentage change in the resistivity from room temperature to 700˚C	L5	5	H

Blooms Taxonomy Outcome

Blooms Taxonomy	Course Outcome (CO)	Levels	Marks Distributed	Weightage (%)	Marks for 10
Level 1 & Level 2	CO1	Low (L)	40	38.09%	3.809 ≈ 4
Level 3 & Level 4	CO2	Medium (M)	50	47.61%	4.761 ≈ 5
Level 5 & Level 6	CO3	High (H)	15	14.28%	1.428 ≈ 1

CO – PO

Condensed Matter Physics (CMP) PG Physics – By Dr. R. Rajaramakrishna

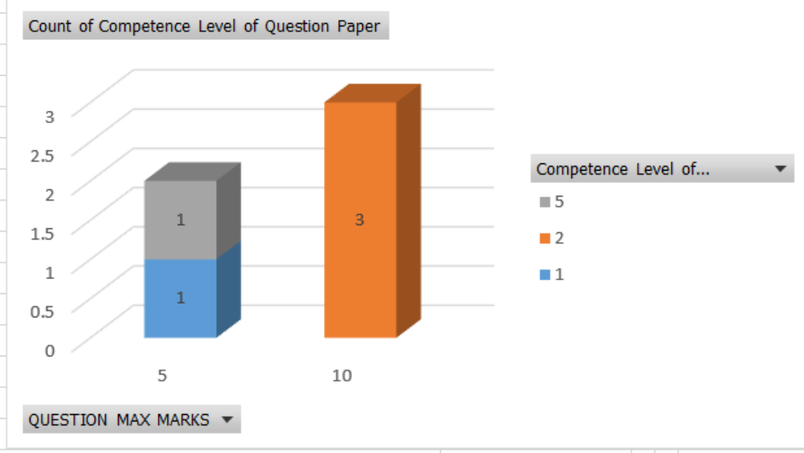
	Faculty Name			Course				Sub									Paper Cod	P302		Paper Title		CMP						
	Dr. R. Rajaramakrishna	PART A						PART B						Part C			CO1 Mark	CO2	CO3	CO4	Total M	TOTAL MAI	IA					
		CO1	CO1	CO2	CO3	CO3	CO4	CO1	CO2	CO2	CO3	CO4	CO4	CO1	CO2	CO4	Unit 1	Unit 2	3	4								
Reg N	Student Name	5	5	5	5	5	5	10	10	10	10	10	10	5	5	5	25	30	20	30								
1	Amrutha G	3	2	0	2	2	0	2	5	5	0	0	0	3	9	3	**10**	**19**	**4**	**3**	36	47	20					
2	DEEPAK HEBBAR V	3	2	2	0	0	4	6	6	6	0	4	0	9	2	1	**20**	**16**	**0**	**9**	45	53	17					
3	Ganesh Prasad S	0	3	2	3	3	0	7	7	7	7	0	0	3	3		**13**	**19**	**13**	**0**	45	68	23					
4	Garima Sharma	4	0	4	5	5	0	8	8	0	8	0	8	4	0	4	**16**	**12**	**18**	**12**	58	82	24					
5	Kavya J		5	5		3	5	9	7	8	0	8	0	3	0	3	**17**	**20**	**3**	**16**	56	79	23					
6	Pavan Kumar	2	2	3	0	0	0	7	9	9	0	0	0	3	2	0	**14**	**23**	**0**	**0**	37	55	18					
7	Sandhya S	4	4			4	4	8			9	8	9	5	0	4	**21**	**0**	**13**	**25**	59	80	21					
8	Shilpa			4	2			6	7		7	7	0	3		2	**9**	**11**	**9**	**9**	38	60	22					
9	Sharvani	4	3	4	3			7	7	7	7				2	2	**14**	**20**	**10**	**2**	46	70	24					
10																	**0**	**0**	**0**	**0**	0	0						
	BLOOMS TAXONOMY	Mem	Analyti	Critical Thinking													**CO WISE MAX MARKS**				0							
		L - 1,	M-4, 5	H- 5, 6 (3)													CO1	CO2	CO3	CO4	0							
		Reme	Apply	Evaluate																	0							
		Unde	Analyze	Create																	0							
	BLOOMS TAXONOMY	1	2	2	2	2	2	3	4	4	2	4	4	5	5	5												
	QUESTION MAX MARKS	5	5	5	5	5	5	10	10	10	10	10	10	5	5	5	25	30	20	30	105							
	Threshold	20						20									10	12	8	12	42							
	Competence Level of Question Paper																				0							
	No Of students Attained Threshold Leve	CO1	CO2	CO3				CO4	CO5								8	7	5	3	23							
																	89%	**78%**	**56%**	**33%**								
		Scores from Student performance															**3**	**3**	**2**	**1**								
		CO1	3																									
		CO2	3																L1	L2		L3						
		CO3	2					Student Threshold								Marks	No of students		10	15		20						
		CO4	1					50 to 60								10 to 1	8	4	L									
								60 to 70								15 to 2	4	2	M									
								70 +								20 to 3	2	2	H									

CO – attainment of Individual students details

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
1	**Dr. R. Rajaramakrishna**																									
2	Weightage		7.5				2.5																			
3	Max Marks		25		5	5	10																			
4					CO 1				CO2						CO3						CO4					
5	Reg No	Student Name	Marks	IA	Attend	Assignme	Attend + Ass	CO1 attainment	Marks	IA	Attend	Assignme	Attend + A	CO1 attain	Marks	IA	Attend	Assignme	Attend + A	CO1 attain	Marks	IA	Attend	Assignme	Attend + A	CO1 attainment
6	1	Amrutha G	10	20	5	5	10	55%	19	20	5	5	10	82%	4	20	5	5	10	37%	3	20	5	5	10	34%
7	2	DEEPAK HEBBAR V	20	17	5	5	10	85%	16	17	5	5	10	73%	0	17	5	5	10	25%	9	17	5	5	10	52%
8	3	Ganesh Prasad S	13	23	5	5	10	64%	19	23	5	5	10	82%	13	23	5	5	10	64%	0	23	5	5	10	25%
9	4	Garima Sharma	16	24	5	5	10	73%	12	24	5	5	10	61%	18	24	5	5	10	79%	12	24	5	5	10	61%
10	5	Kavya J	17	23	5	5	10	76%	20	23	5	5	10	85%	3	23	5	5	10	34%	16	23	5	5	10	73%
11	6	**Pavan Kumar**	14	18	5	5	10	67%	23	18	5	5	10	94%	0	18	5	5	10	25%	0	18	5	5	10	25%
12	8	Sandhya S	21	21	5	5	10	88%	0	21	5	5	10	25%	13	21	5	5	10	64%	25	21	5	5	10	100%
13	9	Shilpa	9	22	5	5	10	52%	11	22	5	5	10	58%	9	22	5	5	10	52%	9	22	5	5	10	52%
14	10	Sharvani	14	24	5	5	10	67%	20	24	5	5	10	85%	0	24	5	5	10	25%	2	24	5	5	10	31%
15																										
16				CO1	89%																					
17	CO evaluation	40		CO Attain	3																					
18	CO	4																								
19	Each CO	10																								

CO – attainment of Individual students details as per Question paper competence

	A	B	C	D	E
4	**Row Labels**		**1**	**2**	**5 Grand Total**
5	5		1		1 2
6	10			3	3
7	**Grand Total**		**1**	**3**	**1 5**



CO – PO attainment of CMP subject in Percentage

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	CO1	CO2	CO3	CO4												
2	3	3	2	1												
3										**Program Objectives (PO's)**	**CO 1**	**CO 2**	**CO 3**	**CO 4**	**PO Attainment**	**Attainment %**
4									PO 1	Basic Knowledge, Law of Causality	2	2	2	2	2.25	75%
5			CO1	CO2	CO3	CO4			PO 2	Problem Analysis	3	3	3	3	2.25	75%
6		PO1	2	2	2	2		Scores from Student performance	PO 3	Design or development	3	3	3	3	2.25	75%
7		PO2	3	3	3	3	CO1	3	PO 4	Conduct or investigations for problems	3	2	2	3	2.2	73%
8		PO3	3	3	3	3	CO2	3	PO 5	modern tool usage	3	2	2	0	2.714285714	90%
9		PO4	3	2	2	3	CO3	2	PO 6	The scientist and society	2	2	2	0	2.666666667	89%
10		PO5	3	2	2	0	CO4	1	PO7	Environment and Sustainablity	0	0	0	2	1	33%
11		PO6	2	2	2	0			PO8	Ethics	0	0	0	0	0	0%
12		PO7	0	0	0	2			PO9	Individual and Team work	2	2	0	0	3	100%
13		PO9	2	2	0	0			PO10	Communication	0	0	0	0	0	0%
14		PO12	3	2	2	3			PO 11	Project management and finance	0	0	0	0	0	0%
15									PO12	Lifelong learning	3	3	2	3	2.272727273	82%
16			No of	Marks										**PO Avg**	**2.289297739**	**77%**
17			>75%	3						**Program Educational Objectives (PEO's)**	**CO 1**	**CO 2**	**CO 3**	**CO 4**	**PEO Attainment**	**Attainment %**
18									PEO	Impact on society	2	2	3	2	2.222222222	67%
19									PEO2	Design, Innoation	3	2	2	3	2.2	90%
20									PEO 3	Techically feasible solution	3	3	3	3	2.25	75%
21														**PEO Avg**	**2.224074074**	**78%**

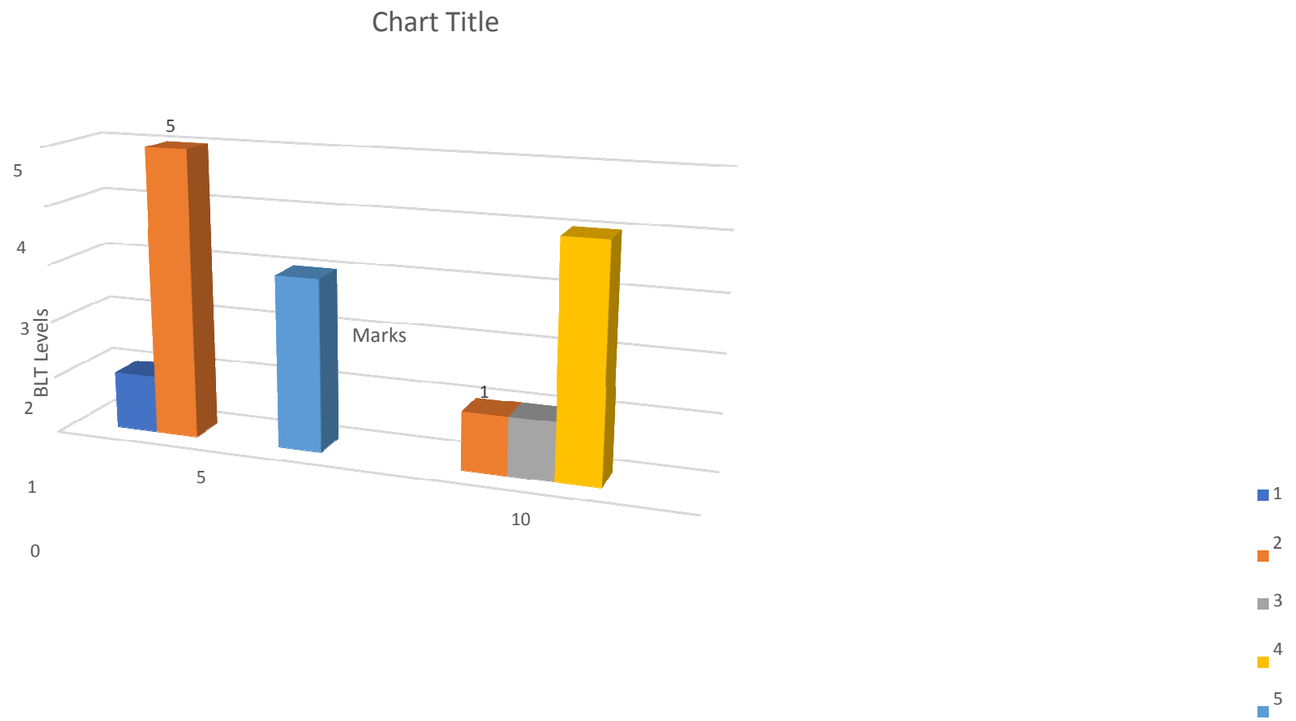
	A	B	C	D	E
1	**CO 1 Syllabus**	**POS**	**Levels**	**PEOS**	**Levels**
2	Crystalline state - periodic arrangement of atoms-lattice translation vectors	PO1	L	PEO1	L
3	The basis and crystal structure, primitive and non-primitive lattice cell, Miller indices/Plane	PO1,PO2,PO9	M,M,M	PEO2, PEO3	M,H
4	fundamental types of lattice, -2d and 3-d Bravias lattice and crystal systems.	PO2,PO3,PO9	M,H,M	PEO1	M
5	Elements of symmetry operationspoints and space groups-nomenclature of crystal directio	PO2,PO4,PO5	H,H,M	PEO2, PEO3	H,H
6	**X-ray diffraction**: Scattering of x-rays, Laue conditions and Bragg's law,	PO1,PO5,PO6,PO12	M,H,M,H	PEO1, PEO2, PEO3	H,H,H
7	atomic scattering factor, geometrical structure factor, Reciprocal lattice and its properties.	PO2,PO5	H,H	PEO3	H
8					
9					
10	**CO 2 Syllabus**	**POS**	**Levels**	**PEOS**	**Levels**
11	Free electron model, Electrons moving in one dimensional potential well,	PO1, PO2	L,H	PEO2, PEO3	M,M
12	3-D potential well, quantum state and degeneracy, the density of states	PO1,PO2,PO4	M,H,M	PEO2, PEO3	H,H
13	Fermi-Dirac statistics, effect of temperature on Fermi distribution function, the electronic s	PO2,PO4,PO12	H,M,M	PEO1, PEO2, PEO3	M,M,M
14	Electrical conductivity of metals, relaxation time and mean free path,	PO1,PO2,PO4,PO5	L,M,M,M	PEO2, PEO3	M,M
15	**Band theory of solids: Elementary ideas of formation of energy bands. Bloch functio**	PO1,PO3,PO6	M,M,M	PEO1, PEO2, PEO3	L,M,M
16	Kronig-Penney model, number of states in a band, Energy gap. Distinction between metals,	PO2,PO3,PO6,PO9	H,M,M,M	PEO3	H
17	Insulators and intrinsic semiconductors.concept of holes, equation of motion for electrons and holes, effective mass of electrons and holes	PO1,PO2,PO3	L,M,H	PEO1,PEO3	M,M
18	**CO 3 Syllabus**	**POS**	**Levels**	**PEOS**	**Levels**
19	Introduction to semi conductors, band structure of semi conductors,	PO1, PO3	L,M	PEO1, PEO2	M,M
20	Intrinsic and extrinsic semiconductors, expression for carrier concentration (only for intrin	PO2,PO3,PO4	M,M,M	PEO1, PEO2, PEO3	M,H,H
21	Ionization energies, charge neutrality equation	PO1,PO2,PO3	M,M,M	PEO1	H
22	Conductivity-mobility and their temperature dependence, Hall effect in semiconductors.	PO1,PO2,PO3,PO4	M,H,H,H	PEO1, PEO2, PEO3	M,M,M
23	**Superconductors: Critical temperature-persistent current-occurrence of super condu**	PO1,PO2,PO3,PO5,PO	M,M,M,H,H,	PEO1, PEO2, PEO3	M,H,H
24	Non-ideal superconductors-Destruction of super conductivity by magnetic field -	PO1,PO3	M,M	PEO2	M
25	Meissner effect- heat capacity-energy gap-microwave and infrared properties- Isotope effect-	PO1,PO2,PO3,PO6,PO	M,H,H,M,M	PEO1,PEO2	H,H
26	**CO 4 Syllabus**	**POS**	**Levels**	**PEOS**	**Levels**
27	Introduction, Review of basic formulae, Dielectric constant and displacement vector	PO1, PO2	L,M	PEO1, PEO2, PEO3	L,M,M
28	Different kinds of polarization-local electric field-Lorentz field-Clausius-Mossatti	PO1, PO2, PO3	L,M,H	PEO2, PEO3	M,H
29	Expressions for electronic, ionic and dipolar polarizability, Ferroelectricity and peizo electri	PO2,PO4,PO7,PO12	M,H,M,H	PEO1, PEO2, PEO3	M,H,H
30					
31	**Review of basic formulae -classification of magnetic materials**	PO1	L	PEO1	H
32	Langevin theory of diamagnetism, para-magnetism and Ferromagnetism –domains	PO1,PO2,PO3,PO4	H,H	PEO2, PEO3	H
33	Weiss molecular field theory (classical)-Heisenberg exchange interaction theory- Antiferro-magnetism and	PO2,PO3,PO4	H,M,M	PEO3	H

PO's and PEO's

CO 1	Understand and ideate the nanomaterials in field of sensors, catalysts, storage and magnetic materials															
		Scores														
	L	M	H	Total Score	Total PO	Net Score	around			BLT	Nos	Score				
PO1	1*1	2*2	0*3	5	3	1.67	2			L	1	1				
PO2	0*1	2*2	2*3	10	4	2.50	3			M	7	2				
PO3	0*1	0*2	1*3	3	1	3.0	3			H	7	3				
PO4	0*1	0*2	1*3	3	1	3.0	3									
PO5	0*1	1*2	2*3	8	3	2.7	3			L	M	H	Total Scor	Total PEO	Net Score	around
PO6	0*1	1*2	0*3	2	1	2.0	2		PEO1	1*1	1*2	1*3	6	3	2.00	2
PO9	0*1	2*2	0*3	4	2	2.0	2		PEO2	0*1	1*2	2*3	8	3	2.67	3
PO12	0*1	0*2	1*3	3	1	3.0	3		PEO3	0*1	0*2	4*3	12	4	3.0	3

PEO1	Impact on society	PO1	Basic Knowledge, Law of Causality
PEO2	Design, Innoation	PO2	Problem Analysis
PEO 3	Techically feasible s	PO3	Design or development
		PO4	Conduct or investigations for problems
		PO5	modern tool usage
		PO6	The scientist and society
		PO7	Environment and Sustainablity
		PO8	Ethics
		PO9	Individual and Team work
		PO10	Communication
		PO 11	Project management and finance
		PO12	Lifelong learning

	A	B
1	PO 1	Basic Knowledge, Law of Causality
2	PO 2	Problem Analysis
3	PO 3	Design or development
4	PO 4	Conduct or investigations for problems
5	PO 5	modern tool usage
6	PO 6	The scientist and society
7	PO7	Environment and Sustainablity
8	PO8	Ethics
9	PO9	Individual and Team work
10	PO10	Communication
11	PO 11	Project management and finance
12	PO12	Lifelong learning
13	PEO	Impact on society
14	PEO2	Design, Innoation
15	PEO 3	Techically feasible solution



	5	10
1	1	
2	5	1
3		1
4		4
5	3	

BLOOMS TAXONOMY BASED ON QUESTION PAPER COMPETENCE LEVEL

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
5							BLOOMS TAXON	1	2	2	2	2	2	3	4	4	2	4	4	5	5	5
6							QUESTION	5	5	5	5	5	5	10	10	10	10	10	10	5	5	5
7	QUESTION	Competence Level of Question Paper																				
8	10	2																				
9	10	2																				
10	10	2						BLOOMS TAXON	QUESTION MAX MARKS													
11	5	1						1	5													
12	5	5						2	5													
13								2	5													
14								2	5													
15								2	5													
16								2	5													
17								3	10													
18								4	10													
19								4	10													
20								2	10													
21								4	10													
22								4	10													
23								5	5													
24								5	5													
25								5	5													

	A	B	C	D	E	F	G	H	I
1	QUALITY OF Question Paper								
2									
3	Marks	5	5	5	5	10	10	5	5
4	Quality	4	5	4	3	2	4	5	6
5	BLT	A	E	A	A	R	A	E	E
6									
7		Benchmar	Attainment Levels						
8									
9	LEVEL	50 to 60 %	15						
10		60 to 70%	18						
11		70 +	21						

CO1 Attainment with PO's and PEO's

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
1	**CO 1 Syllabus**	**POS**	**Levels**	**PEOS**	**Levels**	CO 1	Understand and ideate the nanomaterials in field of sensors, catalysts, storage and magnetic materials															
2	Crystalline state - periodi	PO1	L	PEO1	L		Scores															
3	The basis and crystal stru	PO1,PO2,P	M,M,M	PEO2, PEO	M,H		L	M	H	Total Scor	Total PO	Net Score	around			BLT	Nos	Score				
4	fundamental types of latti	PO2,PO3,P	M,H,M	PEO1	M	PO1	1*1	2*2	0*3	5	3	1.67	2			L	1	1				
5	Elements of symmetry ope	PO2,PO4,P	H,H,M	PEO2, PEO	H,H	PO2	0*1	2*2	2*3	10	4	2.50	3			M	7	2				
6	**X-ray diffraction**: Scatte	PO1,PO5,P	M,H,M,H	PEO1, PEO	H,H,H	PO3	0*1	0*2	1*3	3	1	3.0	3			H	7	3				
7	atomic scattering factor, g	PO2,PO5	H,H	PEO3	H	PO4	0*1	0*2	1*3	3	1	3.0	3									
8						PO5	0*1	1*2	2*3	8	3	2.7	3			L	M	H	Total Sc	Total PE	Net Scor	around
9						PO6	0*1	1*2	0*3	2	1	2.0	2		PEO1	1*1	1*2	1*3	6	3	2.00	2
10						PO9	0*1	2*2	0*3	4	2	2.0	2		PEO2	0*1	1*2	2*3	8	3	2.67	3
11						PO12	0*1	0*2	1*3	3	1	3.0	3		PEO3	0*1	0*2	4*3	12	4	3.0	3

CO2 Attainment with PO's and PEO's

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	**CO 2 Syllabus**	**POS**	**Levels**	**PEOS**	**Levels**			Scores					
2	Free electron model, Electrons moving in one dimensional po	PO1, PO2	L,H	PEO2, PEO3	M,M		L (1)	M (2)	H (3)	Total Scor	Total PO	Net Score	around
3	3-D potential well, quantum state and degeneracy, the density	PO1,PO2,PO4	M,H,M	PEO2, PEO3	H,H	PO1	3	1	0	5	4	1.25	2
4	Fermi-Dirac statistics, effect of temperature on Fermi distribu	PO2,PO4,PO12	H,M,M	PEO1, PEO2, PEO3	M,M,M	PO2	0	2	4	16	6	2.67	3
5	Electrical conductivity of metals, relaxation time and mean fr	PO1,PO2,PO4,PO5	L,M,M,M	PEO2, PEO3	M,M	PO3	0	2	1	7	3	2.3	3
6	**Band theory of solids: Elementary ideas of formation of e**	PO1,PO3,PO6	M,M,M	PEO1, PEO2, PEO3	L,M,M	PO4	0	3	0	6	3	2.0	2
7	Kronig-Penney model, number of states in a band, Energy gap	PO2,PO3,PO6,PO9	H,M,M,M	PEO3	H	PO5	0	1	0	2	1	2.0	2
8	Insulators and intrinsic semiconductors.concept of holes, equation of motion for electrons and holes, effective mass of	PO1,PO2,PO3	L,M,H	PEO1,PEO3	M,M	PO6	0	2	0	4	2	2.0	2
9						PO9	0	1	0	2	1	2.0	2
10			Numbers			PO12	0	1	0	2	1	2.0	2
11		PO1	4							0			
12		PO2	6							0			
13		PO3	3				L (1)	M (2)	H (3)	Total Scor	Total PEC	Net Score	around
14		PO4	3			PEO1	1	1	0	3	3	1.00	1
15		PO5	1			PEO2	0	4	1	11	3	3.67	4
16		PO6	2			PEO3	0	5	2	16	4	4.0	3
17		PO9	1										
18		PO12	1										
19		PEO1	2										
20		PEO2	5										
21		PEO3	7										

CO3 Attainment with PO's and PEO's

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	**CO 3 Syllabus**	**POS**	**Levels**	**PEOS**	**Levels**			Scores					
2	Introduction to sem	PO1, PO3	L,M	PEO1, PEO2	M,M		L (1)	M (2)	H (3)	Total Scor	Total PO	Net Score	around
3	Intrinsic and extrins	PO2,PO3,PO4	M,M,M	PEO1, PEO2, PEO3	M,H,H	PO1	3	1	0	5	6	0.83	2
4	Ionization energies,	PO1,PO2,PO3	M,M,M	PEO1	H	PO2	0	2	4	16	5	3.20	3
5	Conductivity-mobil	PO1,PO2,PO3,PO4	M,H,H,H	PEO1, PEO2, PEO3	M,M,M	PO3	0	2	1	7	7	1.0	3
6	**Superconductors:**	PO1,PO2,PO3,PO5,PO6,PO12	M,M,M,H,H	PEO1, PEO2, PEO3	M,H,H	PO4	0	3	0	6	2	3.0	2
7	Non-ideal supercon	PO1,PO3	M,M	PEO2	M	PO5	0	1	0	2	1	2.0	2
8	Meissner effect- heat capacity- energy gap-	PO1,PO2,PO3,PO6,PO12	M,H,H,M,M	PEO1,PEO2	H,H	PO6	0	2	0	4	2	2.0	2
9						PO9	0	0	0	0	0	#DIV/0!	0
10			Numbers			PO12	0	1	0	2	2	1.0	2
11		PO1	6										
12		PO2	5				L (1)	M (2)	H (3)	Total Scor	Total PEO	Net Score	around
13		PO3	7			PEO1	1	1	0	3	3	1.00	1
14		PO4	2			PEO2	0	4	1	11	3	3.67	4
15		PO5	1			PEO3	0	5	2	16	4	4.0	3
16		PO6	2										
17		PO9	0										
18		PO12	2										
19		PEO1	5										
20		PEO2	6										
21		PEO3	3										

CO4 Attainment with PO's and PEO's

	A	B	C	D	E	F	G	
1	**CO 4 Syllabus**	**POS**	**Levels**	**PEOS**	**Levels**			Sc
2	Introduction, Review of basic formulae	PO1, PO2	L,M	PEO1, PEO2, PEO3	L,M,M		L (1)	M (
3	Different kinds of polarization-local el	PO1, PO2, PO3	L,M,H	PEO2, PEO3	M,H	PO1	3	
4	Expressions for electronic, ionic and d	PO2,PO4,PO7,PO12	M,H,M,H	PEO1, PEO2, PEO3	M,H,H	PO2	0	
5	**Review of basic formulae -classificat**	PO1	L	PEO1	H	PO3	0	
6	Langevin theory of diamagnetism, para	PO1,PO2,PO3,PO4	H,H	PEO2, PEO3	H	PO4	0	
7	Weiss molecular field theory (classical)-Heisenberg exchange	PO2,PO3,PO4	H,M,M	PEO3	H	PO5	0	
8						PO7	0	
9			Numbers			PO9	0	
10		PO1	4			PO12	0	
11		PO2	5					
12		PO3	3					
13		PO4	3					
14		PO5	0					
15		PO7	1					
16		PO9	0					
17		PO12	1					