## Vivekanand College, Kolhapur. (Autonomous) Department of Physics Internal Examination Notice 2019-20

Date: 15/01/2020

All students of class B.Sc. I, B.Sc. II and B.Sc. III are hereby noticed that the second term internal evaluation examination is scheduled as per following time table. Nature of question paper:

For B.Sc. I: Long answer question (Any one from given two questions) for 10 marks

Short answer question (Any two from given three questions) for 10 marks

For B.Sc. II : Long answer question (Any one from given two questions) for 10 marks

Short answer question (Any two from given three questions) for 10 marks

**For B.Sc. II** (Astro) : Long answer question (Any one from given two questions) for 10 marks Short answer question (Any two from given three questions) for 10 marks

For B.Sc. III: Long answer question (Any one from given two questions) for 10 marks

Short answer question (Any two from given three questions) for 10 marks Internal Evaluation Examination 2019-20. SEM II, SEM IV and SEM VI Time Table

Sr. No.	Class	Paper	Date	Time
1.	B.Sc. I	Paper II	27/01/2020	11:00 am to 12:00 pm
2.	B.Sc. II	Paper IV	27/01/2020	11:00 am to 12:00 pm
3.	B.Sc. II (Astrophysics)	Paper II	28/01/2020	11:00 am to 12:00 pm
4.	B.Sc. III	Paper VII (section I)	29/01/2020	11:00 am to 12:00 pm
		Paper VII (section II)	_	01:00 am to 02:00 pm
		Paper VIII (section I)	30/01/2020	11:00 am to 12:00 pm
		Paper VIII (section II)		01:00 am to 02:00 pm



Vivekanand College, Kolhapur

"Dissemination of Education for Knowledge, Science and Culture" - Shikshanmaharshi Dr. Bapuji Salunkhe

Shri Swami Viyekanand Shikshan Sanstha's

# Vivekanand College, Kolhapur

(Autonomous)

# Department of Physics Internal exam (2019-20) B.Sc.III Sem VI

## Attendance Sheet

Roll No.	Name Of The Student		Sign	ature	
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8001	Chougule Abhijeet Bajirao	Angule	Chargele	Chargen	Thagale
8002	Dalvi tejas chetan	Lalvi	Ltavi	Laivis	Ande
8003	Dinde Akash Sadashiv	Ande	Fonde,		
8004	Gaikwad Suraj Dhananjay	Gailywad	Gaikmach	Gaikunad	Guitrurad
8005	Ghosalkar Pranav Shankar	Engsakar	Choaker	(thanka	
8006	Harshad Sitaram Katroot	Hatsod	Harrot	Hatrot	Haroot
8007	Jadhav Pratiksha Harish	Jadhav	Jadhav	Jaghav	Jachav
8008	Joshi Sourabh Kiran	E.	-	- An	an
8009	Kamble Prasad Vilas	PIQ.	PD.	(PK)	P. M. Kumb
8010	Kumbhar Prathmesh Mallikarjun	P.M. Kumbhur	P.M. Kurobha		
8011	Kumbhar Jayvant Rajaram	yrk.	Jok.	YRK.	JAK.
8012	Manasi Vinayak Kulkarni	Hansi	Manse	Hanse	Mansi
8013	Manasi Kahnderao Jagadale	Jagelde	Jagade	Toplale	Jagdle.
8014	Nalavade Ankita Amar	Annde.	Alalunde	Alwade	Alalarad
8015	Paranjape Anish Shriram	Ar	AF	The	The
8016	Patil Amruta Bhuigonda	A Patil	A.Patrij	A.Pastil	A. Patil
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### Vivekananda College Kolhapur (Autonomous). Department of Physics: Internal examination2021-22 B.Sc. III Semester V

Subject: Electrodynamics and Electromagnetic Waves Marks: 20 (Each question carry one mark) Time : 20 min

#### Q.1 Attempt any ONE

(10)

(10)

- 1. Derive Poisson's equations and their physical significance
- 2. Derive Laplace's equations and their physical significance

#### Q.2 Attempt any TWO

- 1. Discuss Laplace's equation in one dimension and its solution(Cartesian coordinate).
- 2. Derive an expression for motion of charged particle in uniform electric field.
- 3. Derive an expression for uniform magnetic field.



Name Jeevan Maruti Vati " ज्ञान, विज्ञान आणि सुसंस्कार यांसाठी शिक्षण प्रसार " Signature of - शिक्षणमहर्षी डॉ. बापूजी साळुंखे Supervisor Shri Swami Vivekanand Shikshan Sanstha's VIVEKANAND COLLEGE (Autonomous), KOLHAPUR Roll No. Sola Class Bsc.ITT. Subject Physics Suppliment No. \_ Internal Exam Test / Tutorial No. Derive an expression for motion of charge particle G. in constant uniform magnetic Field. Let us consider a charge particle of charge 9 and mass on moving in constant magnetic field B. YT 11 (0,Y charge 9 X = 10 = 7 Path of charged ponticle in unform 13 field Under the action of these integratic field, the charge particle moves in a plane perpendiculas to B i.e. in x- y plane. The Force acting on a charged particle because of magnetic, Field B is. - 0  $F = q(v \times B)$ let, isik be the unit vectors along R. Y. 2 axes respectively. .: if vx and vy are component of velocities of the charged particle along & and & directions respectively V = ivx + jYy 2 E.B. THE A.M. According to Newton's second law of motion, force acting on the charged porticle, is F=m.dv · dt

- 0 dv = i w dt Intergrating above ear for velocity & time  $\int \frac{dv}{v} = \int \frac{dv}{v} dt$  $[109v]_{V_0}^{\vee} = i\omega [+]_{V_0}^{\dagger}$ (10) 109 V - 109 Vo = 1607  $109\left(\frac{v}{vo}\right) = icot$ v = eiwt V = Vo eint .... V = Vx +ivy But eiut = cosust + is in wt and equation becomes (Vx +ivy) = Vo (cas wit + isin wt) -00 comparing real & imaginary paits on both sides -02 Yn = Vo coswt Ny = Vosinwt (13) squaring & adding equation  $v_{x}^{2} + v_{y}^{2} = v_{z}^{2} \cos^{2}(\phi) + v_{z}^{2} \sin^{2}(\phi)$  $\frac{\sqrt{x} + \sqrt{y}}{\sqrt{x} + \sqrt{y}} = \frac{\sqrt{2}}{2}$ V = Vo Further, Vx = dx/dt 1. Jan dr = Vocoswit 32 da = vocoscot.dt Integrate above equations Section Marine

Sdar = Svocoswidt x = vo sincot the (4) k is constant of intergration, At t=0, d=0 and lezo vy = dy/df dy/dt = vo sin wt dy = Vosinwi-dt Integrate above eau Jdy = Svosinwt  $y = -\frac{\sqrt{6}}{4} \cos(4t) + ic$ - (3) AI- t=0, y=0 then 0 = - volu + K IC = Vo/W a agidovo -Hence equation (D) changes to y = - voi cost wt + vo  $y = v_0 - v_0 \cos \theta - \overline{0}$ Same such as the same such = = radius of path taken by charged No But particle or the the CD x = rsinwt 1 152 - (8) y= r-r cos wt - (9) y-r = -rcosul Squaring and adding eq (3) and (9)  $x^{2} = (y - r)^{2} = r^{2} \sin^{2} \omega t + r^{2} \cos^{2} \omega t$   $x^{2} + (y - r)^{2} = r^{2}$  (0)This ea? is equation of circle with circle (0) radiw r. .: Thus motion of charged particle in B Field is circula.

'' ज्ञान, विज्ञान आणि सुसंस्कार यांसाठी शिक्षण प्रसार '' Signature of - शिक्षणमहर्षी डॉ. बापूजी साळुंखे Supervisor Shri Swami Vivekanand Shikshan Sanstha's VIVEKANAND COLLEGE (Autonomous), KOLHAPUR ands B.SL-TTT-20 Class . Roll No. \_8019 Suppliment No. Subject Physics Test / Tutorial No. Internal Exam - 1 Suppose Ans -1 The motion of P charged particle in a constant Uniform magnetic field. VOD 2 Consider charge particle 9 of mass a moving with velocity vo along the x axis Let it enters in a constant uniform magnetic 0 Field & directed along -ve 'z' direction. Due to magnetic field particle experience magnetic force Fm & it is given by.  $fm = Q(V \times B) - O$ Where v= velocity of pasticle in m.F. Under the act of maynetic force for the particle moves in a direction 1st to BOV. I.e the particle moves in X, y plane with veloying and & it is given by (V)

V= ivz tjvy. -0 Acc to New ton's 2nd low we have, Fm = ma = mdv - 0We have v=ivx+jvy B = -kBVn Vnbloit singraus antists 0° 0 B = i (-BVy) - j (-BV2) VYB = iBvy+ iBVA. heance eqn D becomes.  $\frac{d}{d} \left[ \frac{1}{2} \sqrt{1} + \frac{1}{2}$ d7  $= 1 \left[ -\frac{98}{m} \sqrt{3} \right] + 3 \left[ \frac{98}{m} \sqrt{3} \right]$  $\frac{dV_{n}}{dt} = -\frac{qB}{m} \cdot v_{y} = -\omega v_{y} - \Theta$ dvy = 98 vn = wva - @ in to det while in spreds mobilities it where pusto 9B, plinday the philos at multiplying eqn @r by nimagingry not () & dun + idvy - - wy + i w x + i 3 mi in de Endaigy Jo= jour ENnit iva inditer de protestion of the protesting of the sheet putit Vik + ingevillarity - O a ivolar mue get k x ni involut Esto id arrig il i une 1904

eqn @ is a diff" eqn of the Ist order. dv = hodt. Change II Integrating at both side.  $\int_{v} \frac{dv}{v} = \int_{v} \frac{1}{v} \frac{dv}{v} = \int_{v} \frac{1}{v} \frac{dv}{v} \frac{dv}{v} = \int_{v} \frac{1}{v} \frac{dv}{v} \frac{dv}{v} \frac{dv}{v} = \int_{v} \frac{1}{v} \frac{dv}{v} \frac{d$  $[togv]_{vo} = iwi \cdot i wi = i$ Log V = just Europhin - V Vo Vo printiplies is printiplies N=Veint. ein services 1516 substituting value laf vy we get po would Vativy = yoe wt. Vativy = Vo [cas wittisin wi] Vn + ivy = vo coswt + ivo giwt. Equating real torms & imaginary terms. Vn = Voces W1. Vy = Vosin Wt. lonsider Nn = YO SOS WY.  $\frac{\partial x}{\partial t} = \frac{\sqrt{2} \cos \omega t}{\partial t}$   $\frac{\partial x}{\partial t} = \frac{\sqrt{2} \cos \omega t}{\partial t}$   $\frac{\partial x}{\partial t} = \frac{\sqrt{2} \cos \omega t}{\partial t}$ Integrating at both sides. Sdn = Vo S (os with dt) n = Vo S (os with dt) wt.

Now consider the off officer at of "py Vy = Vosin wt dy \_ vo sin wt. entinen di dy= Vo sin wt dt. on integrating S dy = vo S Sin widt.  $y = \frac{v}{w} [cos widt]' = \frac{vo}{w} [cos widt]'$ Y=-7 (cos ot -r)  $Y = -r - r \cos \omega t - 8$  $Y - r = t - r \cos \omega t - 9$ squaring & adding eqn (8) & 10 we get 22+ (y-8)2= m2 . 100 11 . V Above egn is egn at kircle which given trajectory of partiele is circular. 1 x 01 = py1 + 1 [ upail & har wood av - put hav Instravit 1 Harro av - Avit NV F MV percippini a prime love printing a 1010 - 1/21 (0) of : nit . but hig ou . bu ... 1 packing 6 (1) . 20 ) ov : 10 hur 200 Por xt HIN A X ON DV INCS E. Dize altog L. Laikar Shis 11 100 11 12 ... 1126112 10

## Vivekananda College Kolhapur (Autonomous). Department of Physics: Internal examination 2019-20

B.Sc. III Semester V

Subject: Energy Studies and Materials Science

 Marks: 20 (Each question carry one mark)
 Time : 20 min

 Q.1 Attempt any ONE
 (10)

 1. Discuss briefly wind energy, wind energy chains, wind energy quantum
 2. Write a note on Efficiency factor of wind turbine(P-H graph).

 Q.2 Attempt any TWO
 (10)

 3. Write a note on Classification of energy resources.
 (10)

4. What are the types of types of a wind turbine generator unit.

. .

5. Define the factors : a) wind energy chains, b) wind energy quantum, c) wind power density, d) power of wind turbine for a given incoming wind velocity



।। ज्ञान, विज्ञान आणि सुसंस्कार यांसाठी शिक्षण प्रसार ।। - शिक्षणमहर्षी डॉ. बापूजी साळुंखे 34050 Shri Swami Vivekanand Shikshan Sanstha Kolhapur's ND COLLEGE, KOLHAP UR (AUTONOMOUS) Signature SUPPLIMENT of 115 Supervisor Subject: (Energy studies and Suppliment No. : Test/Tutorial No.: Internal exam : 8525 Roll No. Div. : Class B.Sc. III, Sem - V Q.1 The power output of wind tarbine depends on 2> it is located as well as the physical where It the turbine itself characteristics will be that the wind Speed unlikely highly any an the outrus location Steade 14 with the speed at any will vary CI Aurbin win This is where Aime current hen 10 estimate can nower future output neon and Roted opposite Speed car aut 1 Powe ñ Speed JUNE 1964 speed 

At very low wind speeds, there is insufficient targue exerted by the wind on the Auxbine blades to make them rotate, However, as the speed increases, the wind turbine will region to rotable and generates electrical power. The spred at which the turbine first start to retate and generate power is called the cut - in - speed, and is typically beth 3 and 4 meteres per second The available power in a stream of wind of the wind the same cross sectional area turbine can easily be shown to be 1 p 13 Jide 1 It the wind greed to is in meter per second, the density P is in kibgrome per rubic meter and the rotor diameter of is in meters then the available power in watts. And in Administry · hindre - traderic - traderic -Q-2 There are four types of wind turbines generator which can be considered for the various wind 27 turbine systems those are 1. Direct current (DE) generators A wind generator system has a wind generator system has a wind turbine, a pc generator, an insulated gate bipolar trasistor inverter, a transformer, a controller, and a power grid

2. Ac synchronous Generator: -Ac synchronous wind turbine generators can dake constant or pc excitation from either permanent magnels of electromagnets. 3. Switched Reluctance wind Jurkine Generator switched relutance wind turkine generators have features such as strong rotar and stator JUNE 1964 कोल्हाप्र

।। ज्ञान, विज्ञान	आणि सुसंस्कार यांसाठी शिक्षण प्रसार ।।
Shri Swami Vive	- शिक्षणमहवीं डॉ. बापूजी साळुंखे 34046 kanand Shikshan Sanstha Kolhapur's
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	GE, KOLHAPUR (AUTONOMOUS)
SUPPLIMENT	Signature of Supervisor
Suppliment No. :         19           Roll No. :         20	Subject: Energy Studies and Material
0315	Test / Tutorial No. : Internal Exam
Class : B.Sc-III, Sem-V	Div. :
N. M. A. F.Y. MAR. M. P. M.	the and there is the sub-transmit of the
Q.2>	
3) @ Wind energy chains.	- The wind power value chain incorporates
	acterials; components, manufacture, logistics,
development and oper	ations.
	The second and a make the second
( Wind energy quant	in- wind energy is a form of solar energy,
	nates from the sun. The sun heats the
	that the temperature varies at different
	ull terring to highling symmetry safe s
	Indexe of with an indexes in trading of the
G Wind Power Density -	- Wind power density is a quantitive
	ergy available at any location. It is the
mean annual power	quailable per square meter of swept
	the loss of the second s
@ Power of wind turb	ine - Wind turbines convert the kinetic
	into mechanical power. The mechanical
power can be used	
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Q 2>	
2)	There which can be
	There are four types of wind turbines generator which can be
	considered for the various wind turbine systems those are:
1	1. Direct Current (DC) generators-
	A wind generator system has a wind turbine, a DC
	appendior an insulated gate bipolas fluisses
	transformer, a controller, and a power goid
1	2. AC Synchronous Generator -
	AC synchronous wind turbine generators can take
-04	Constant or DC excitations from either permanent magnets or
	electromagnets.
	3 Switched Reluctance Wind Turbine Generator -
	Switched reluctionce wind tarbine generators have feature
Law .	Such as strong rotor and stator
	Such as strong rotor and stator
0.11	
Q.1>	The second have dependen on where it
_ 2>	The power output of a wind turbine depends on where it
	is located, as well as the physical characteristics of the
	turbine it self. It is highly unlikely that the wind speed
ны	
	will vary in line with the speed at any one time. This is
	where a wind turbine power curve can help to estimate cuerent
0	and near future output. Roted o/pspeed. Cut oul
	Speed
0	Power
	COLLEC
	Cut in Speed
	Cut in speci
	Speed
-	A CARACTER STATES AND

At very low wind speeds, there is insufficient torque exected by the wind on the turbine blades to make them rotate. However, as the speed increases, the wind turbine will region to rotate and generates electrical power. The speed at which the turbine first starts to rotate and generate power is called the cut - in speed. and is typically bet " 3 and 4 pemeters per second. The available power in a stream of wind of the same cross sectional area as the wind turbine can easily be Shown to be: 1 pu3 11d2 If the wind speed U is in meters per second, the density e is in kilograms per critic meter and the rotor diameter d us in meters then the quaitable power in watts.

## Vivekananda College Kolhapur (Autonomous). Department of Physics: Internal examination2019-20 B.Sc. III Semester VI

Subject: Nuclear and Particle Physics

Marks: 20 (Each question carry one mark) Q.1 Attempt any ONE

- 1. Explain the Cyclotron- construction, working, theory- expression for energy of cyclotron and its limitations
- 2. Explain the Synchro-cyclotron construction, working and its advantages, disadvantages.

#### Q.2 Attempt any TWO

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(10)

Time : 20 min (10)

- 1. Discuss the principle of Principle of phase stable orbits
- 2. Derive the expression for Betatron expression of energy gain.
- 3. Write a note on Need of accelerators.



।। ज्ञान, विज्ञान आणि सुसंस्कार यांसाठी शिक्षण प्रसार ।। 34024 - शिक्षणमहर्षी डॉ. बापूजी सार्खुखे Shri Swami Vivekanand Shikshan Sanstha Kolhapur's EKANAND COLLEGE, KOLHAPUR (AUTONOMOUS) Signature SUPPLIMENT of Supervisor 15-20 Particle Subject: Nuclear and Pachic Physics. Test/Tutorial No.: Internal Exam Suppliment No. : Roll No. : 8 509 BSC III sem I Class Div. : 01) 1 a জি জীম**ি** magnet Eartheo Dee 7.5 lotion basically DChrocy itt large iec 2) Instea Emp! rating voltag lulati m JUNE

In Berkely Synchroeyclotion, the modelated frequency is varied from 12.6 mHz to 2.0 MHz, 3) only one dee is used with an earthed conductors on the opposite side of opening other dee Working To import energy to the particle the frequency of an alternating voltage between dees is decreased when the particle goes into a phase stable onbit characterised by a malius with sain energy Tradius with gain energy But this decrease in frequency must be done continuously 4 very elourly as compared to the frequency of alternating voltage applied to the dees decreases stouly 4 continuously, but the peak value of the voltage remains the same usually, modulation is done at So Hz or 60 Hz Thus, syndrocyclotion uses a frequency. modulated radio frequency Advantages of synchrocyllotion As it is based on the principal of phase stable orbit the relativistic mans increase is taken care & therefore there is no need to restart required between the dees may be very difference 2) Large electric fields in the gap requised foclining and accelerating the particles in are number demanded so, usually only on X

Space is made desirable on the ample steel Berkely 184 inch synhie cyclotion gies upto 300 MeV have been repred , the protor Cnergies Q2 principle of uphas The pe that 1) Consider a par Mark Him work + telab'u 0 moning in an o magnesic field, B and cho the influ Angular V  $\left(\frac{\omega = 2\Pi}{T}\right)$  will be constant angular reloci The particle with constant mass m, which Epal of cycloteon. 0. nass energy 4 EK is kinebis the energy of

Thus the angular velocity of the particle in a constant magnetic field, decreases with invease in the kinetic energy of hence the phase melationship required for cyclotion perfocipal. will be upset the were a particle, with a definite kinetic energy the will more in a stalke orbit with constant angular velocity w which is also the angular prequency of the alternating voltage between the dees. such an orbit whose phase - staltility is mainte Now it can be done to the dees. Now it can be seen that the particle with a Specific energy can be mainteined on a phase - stable oelst, it every the will nove in a stable other with constant angular velocity a which is also the angular frequency of it, when the instantureo potential differency access the does is zero & about potential dis to become decelerations

	।। ज्ञान, विज्ञान आणि सुसंस्का Shri Swami Vivekanand S	- शिक्षणमहर्षी डॉ. ब		•
	VIVEKANAND COLLEGE, K	KOLHAPUR	(AUTONOMOUS)	2
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1	Suppliment No. : Roll No. : 8522 Class : B.sc. Sem V	Subject : Nuclea Test / Tutorial No. : J Div. :	rs and Particle physics Internal	<u></u> <u> </u>
	Dansel A and Report of	N	1	1, 5
	Synchrocyclotrop -	ALTER AN	<u>a 10 13 1</u>	<u></u>
		Fig. Sypchroay	du too	
1	Modifications viz	ssically a my	clotron with some	4
	) The size of dees is fair energy is very large & are also very large useighing several tonnes at Instead of simple radio voltage is obtained from In beskeley synchrocycl b varied from 20 Mt	hence the These los are used. brequency of a brequency often, the	pole-piece diame e, huge magnets scillator. the alter modulated supply modulated precise et a modulation	ending course ESTD TOME TOME TOME TOME TOME
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of 120Hz Donly one doe is used with an earthed conductor on the opposite side of opening of the doe as shown in the t above fig. Wasking-4 Oto impart energy to the particle. the frequency キー an alternatively voltage between dees is decreased. azi when the particle goes into phase stable-osbit characteried by a large radius with gain in energy. O but this decrease in frequency must be done continuously & very slowly as compared to Frequency of alternating potential difference across dees. This is achieved by using a frequency modulated supply where in frequency. the alternating voltage applied to the deer decrease slowly I continuously, but the peak value of voltage remains the same ( Usually modulateion is done at so Hz or Gottz. Thus synchrocyclotop uses a frequency modulated radio frequency ascillator & hence it is also known as frequency modulated cycletron Advantages As it is based on principle of phase-stable arbits. the G relativistic mass increase is taken care of and therefore there is no need to restrict the no. of revolutions & (4) bence the potential difference sequired bet" deer may be very small. Usually it is about 15ki at peak of alternating voltage. @ Large electric fields in gap required for focusing and D Large electric fields in gap required for focusing and (ESTOP) accelerating pasticles in cyclotsion are no. longer demand JUNE So usually only I dee is used. Thay ample space is maxeuron

available in equaruated steel tank for setting different targets as other apparatus. (2) In Bestaley 184 inch sychrony dation the proton energies upto 300 MeV have been released. disadvantages -It can't be used to accelerate electoon Luj Phase - stable Orbit Condition-DConsider a particle of relativistic mass m= Mo (1-V2 and charge e moving in an orbit of radius under the influence of magnetic field. B. mr2 Bel Angular relacity co = V Be The angulars relating (0=27 1 will be constant for particles with constant masim, which is the principle of cyclition. But when m increases relativistically then. Bec2 Bec2 moc2 + F. mr2 Ejuhen moci is sest massenergy & Exiskinetic energy al particle 2) Thus, the angular relacity of pasticle in constant with increase in kinetic magnetic field decreases \_ relationship required hence phase cycletion principle will be upset. However, a particle with a definite kinetic energy principle will En will move in stable orbit with constant angular relacity + w which is due angular forequency

alternating voltage Such an oxbit wh bet n dees stability is maintained phase called phasefic 2 Now 1,1 can be the th ene partic Sper tim main alp. be aine ph + (1) adp instantan H dres onten across eou 2000 decele rating and about become to 15: 3 祥 THE GEN 1 JUNE 120 · / /2 1 1 pel

#### Vivekananda College Kolhapur (Autonomous). Department of Physics: Internal examination2021-22 **B.Sc. III Semester V Subject: Solid State Physics** Time: 20 min

Marks: 20 (Each question carry one mark)

(10)

#### Q.1 Attempt any ONE

- -

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- 1. Discuss Reciprocal lattice, Properties of reciprocal lattice.
- 2. Derive Bragg's law in reciprocal Lattice (Ewald's construction).

#### Q.2 Attempt any TWO

(10)

1. Define Powder method of X- ray diffraction.

- 2. Write a note on Miller indices
- 3. Derive packing fraction of HCP structure.



# PRN No. 2015015500159146



# KANAND COLLEGE.

KOLHAPUR	
Information to be filled by Student (विद्यार्थ्याने भरावयाचा रकाना)	G
Day and Date: Tuesday, 23-1-2018	
Language of Answer : English	
Examination: Internal Exam	_
Question Paper Code No :	-
Subject : Physics	
Paper No:	T
Section :	Sig

Jr. Supervisor's Sign :
Students Sign : Prmanmade,
Seat No. 8820
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Q. No.	Examiner Marks	Moderator Marks
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Total	15	
Signature	24	

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TOTAL Q. No. TOTAL Marks Q. No. Que.2. Relation between direct lattice and reciprocal 3 1 lattice :-0150 fd, 1 in 12 1-1 19 1 1 1 1 1 1 v direct lattice & The relation between reciprocal lattice can be calculated cell. of unit Let, V be the volume Volume = Area (shaded region) x height volume = area x di di volume . : area . . area 1 volume d, n = <u>a</u> <u>a</u>.(<u>b</u>x<u>c</u>) 5100 . . d. As a. (Fxc) be the volume. COLLEG, EST utonomo

Q. No. TOTAL. TOTAL. 5 Marks Q. No. Q, Oleo - Bxc a' (b'xz') Reciprocal lattices are given by 5100, 5010 & 500th as they are i was stand and ... E a\* = bxc a(bxc)  $|t|^{ly}, \quad b^{\star} = \vec{c} \times \vec{a}$ a. (bxc) axb c \* The Rent a' (Bxc) This is the relation between direct lattice & reciproal lattice. The entrusion of another all Properties of reciprocal latticest :- 2. milled i) The reciprocal of reciprocal lattice is a direct lattice := = (1/2 x til) to invade at ( ) x 1) 1 The reciprocal lattice a\* is given by, at = Bx10 (\*>x\*1),\*0 (5.0) (a:(5'22) we have to show, ESTD 1()\* (a\*)\* = a. JUNE 1964

TOTAL TOTAL Q. No. 6 Marks Q. No. · (a\*)\*  $= b^* \times c^*$ G a\*. (b\*xc\*) Asle know that, a. a\*=1. Multiply eqn () by a.a\* 2.0  $(a^*)^* = a \cdot a^* b^* \times c^*$ a\*, (b\*xc\* 11 a. a\*. (b\*xc\*) a\*. (b\* x c\*) 5.263 (a\*)\*= a 1.20110 me proved this . hence martini receipor ii) The volume of unit cell in reciprocal the reciprocal volumentingand lattice is of in direct unit lattice cell norainar 9 This a\*. (b\* x c\*) 1. mittal To show : = a. (bxc  $S^{\dagger} = S^{\dagger}$ hanningtoon miltert 13. 0 . . . SAT Broof :a\*. (b\* x c\*) = > bxc\_ { > cxa a. Cbxc a.(bxc) Snaxbr OLLER a. (bx c)

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4 5	$a^{*}.(b^{*}xc^{*}) = 1 - a^{+}$
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TOTAL Q. No. 8 Marks Q. No. The intercept on x-axis is - $OA = \overline{a}$ a north he entercept on y-axis is,  $CB = \overline{b}$ K intercept on z-axis is The octo c e ... From diagram,  $\left(\frac{r}{r}\right)$ 18- 12. - .a = b a scalar produ B. The be the · (ha\*+ kb\*+ lc\*) B. The = (12) - 1-1 =0 and this scalar product value is zenzioues similarly A. Enkl = 0 JUNE 1964 Autonomo hence as their dot product is zero, that are perpendicular to each other. i.e. Every reciprocal lattice vector is perpendicular to direct lattice.

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Received and a
VIVEKANAND COLLEGE, KOLHAPUR
Information to be filled by Student (विद्यार्थ्याने भरावयाचा रकाना)
Day and Date : 23 - 1 - 0 18
Language of Answer : English
Examination: <u>B.Sc. III</u> , Internel
Question Paper Code No :
Subject :Physics
Paper No:
Section :

Jr. Supervisor's Sign :	
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Total	2	
Signature	126	

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TOTAL TOTAL Q. No. 5 Marks Q. No. Realation in terms of interplaner spacing and lattice point given pla reference plane. × Consider the axis XYZ mutually perpendicular to each other. Consider a reference plane posses the intercept 9/1 op x axis, b/k op Yaxis C/2 on 2 axis. and let d'be perpéndicular distance bet? reference plane & given plane. Let Chike) be miller indices of given plane. let & be the angle beth normal and on B be angle bett normal & plane OB & programmal & plane oc. let cos x, cos B, cos P be the direction angle bet? of normal plane by geometry in AAØBC, C05× a/h 1  $\cos \beta = \frac{d}{5/k}$  $\cos y = d$  $\overline{cs}/1$ 

TOTAL TOTAL Q. No. 6 Marks Q. No. by using the property of triangle, trigoometry  $\cos^{2}x + \cos^{2}\beta + \cos^{2}\gamma = 1$ d d d a/h c 6/ = 1 K e  $\frac{h^2}{a^2}$ 2 4 • ē 2 1 1 1 1 Q2 d h2 a2 2 -- 2 2 5.5 7. 1 10 d 12 1.9 2 = apecial case - !! For cubic system a = b = c1927 1 1  $\frac{b^2}{\bar{a}^2}$  + 9 k2 12 =. č2 2 a d he+ 12 = 2 OLLEG ESTC JUNE 1964 Autonomi

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भूमित्राम्हे मान्ह्र काहित कोल्हापूर		Seat No. 8506		
VIVEKANAND COLLEGE		Seat No. in words	3	
KOLHAPUR				
		Center		
Information to be filled by Student			-	
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TOTAL TOTAL Q. No. 4 Marks Q. No. 9.2. ii 3 6 8 ; ; ¥. 4 Here axial length 4A, 8A, 3A Vn Defination:-Orientation of a plane in a crystal Can be described in Jerms of these reciprocal of intercept op 3 arcis. One grial unit on racis 40rial unit OF yoris & zarial unit on r quis as Shown in Fig. The numerical parameter OF the plone use, 1,443 but according to Miller it is more useful to denote or discribe this SCOLLEGE parameters by fating recipror it's numerical value. IUNE 1964 utonomo

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TOTAL TOTAL Q. No. 6 Marks Q. No. d plane. a a/n C A 0 Reference 1.11111 plane. 130 24 10 1 11 1 3 A Allig 1 (OA) = a/h 1(0B) = 6/K 1 - l (oc) = c/e 6.11,5.25 Consider the axis XXX mutually perpandinular to each other. Consider the reference plane passes through the origine f the other plane ABC cuts the plane intercept a/h on xaxis, blk on Yaxis. . C/1 O'D ZOXIS. a normal is drawn to the PLAYFOR ABC. From the origine. ESTD JUNE 1964 Autonomo

TOTAL TOTAL Q. No. Marks . No. <u>d' be the perpandicular distance</u> reference plan & given plane. Let. (hk) miller indices of plane ABC. let, betn given 'z be the angle bet normal et, 5 0A B= angle bet normal OB angle bet normal oc. let COSA COSB, COSD be the direction cosine, of normal. By wing geometery, (OS & = d to site all and to COSB=9/b/k C/e de la com COSY But Cos & + cos 2 B + cos 2 =1 d alb JUNE 1964

TOTAL Q. No. 8 Marks  $\bigcirc$ Q. No. d2 22  $\frac{d^2k^2}{b^2}$ dzh =1 d e2 2 h2 2 2 2 a ŝ 2 2 -l2 K2 d h2 2 az 0 2 k2 62 14  $\frac{h^2}{a^2}$ + + C2 the relation bet interphner this is miller indices. distance 8 Case1: cubical Foo System a = b = c. . d = • 02 h2 K2 C2 22 a2 a. COLLEG d ESTC 2 ١ b2+K2+e2 Cr2 1964 utonom