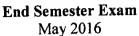Bharatiya Vidya Bhavan's

Sardar Patel College of Engineering
(A Government Aided Autonomous Institute)

Munshi Nagar, Andheri (West), Mumbai – 400058.

End Semester Exam
May 2016

Max. Marks: **75 marks**

Class: F.Y B.TECH   Semester: **II**

Name of the Course: Applied Chemistry -II

Duration: 3.0 H

Program:

Course Code : BT-106

Instructions:

1 questions no 1 is compulsory

2 Attempt any three out of remaining four

3 Draw neat labeled diagrams

4 Atomic Mass (H=1, C=12, O=16, N=14, Cl=35.5, Br=79.9)

Master file.

Question No	Question	Max. Marks	Course Outcome Number	Mod. No.
Q1				
a	A Coal sample contain following composition by weight C=82%, H=4%,O=8%, S=3%,N=2% and Ash=1% calculate gross and net calorific value	5	3	6
b	3.0 g of sample taken for nitrogen estimation by Kjeldahls method. The ammonia required 13.0 ml of 0.5N H_2SO_4 for Neutralization. Using bomb calorimeter 3.0 g of coal sample produced 0.40 g of $BaSO_4$. Calculate percentage of Nitrogen and Sulphur in coal sample	5	3	6
c	Calculate the Atom Economy for following reaction $$CH_3CH_2Br + KOH \text{------------>} CH_3CH_2OH + KBr$$	5		
Q2				
a	Describe 12 principals of green chemistry in details	10	4	7
b	Write note on industrial green solvent	5	4	7
c	Explain alloy of Lead with its composition properties and application	5	2	4
Q3				
a	Explain determination of nitrogen and sulphur by Ultimate analysis with its significance	10	3	6
b	Write short note on octane Value	5	3	6

c	Explain Biodiesel with its synthesis and application	5	3	6
Q4				
a	Explain wet corrosion or electrochemical corrosion with its mechanism	10	1	1
b	Explain the cathodic protection of metal	5	1	2
c	Explain Differential Aeration corrosion with suitable example	5	1	1
Q5				
a	Explain electrochemical and Galvanic series. Write difference between Electrochemical and Galvanic series	10	1	1
b	Write short note on Bimetallic corrosion	5	1	1
c	Write short Note on Knocking	5	3	1

Bharatiya Vidya Bhavan's
SARDAR PATEL COLLEGE OF ENGINEERING
(An Autonomous Institution Affiliated to University of Mumbai)
End Semester Examination for F.Y.BTech (Civil/Mechanical/Electrical)
2015-16

18/05/2016

Total marks: **75**   Duration: **3 Hrs**

Class/Sem: F.Y.BTech (C/M/E) Sem-II   Subject : APPLIED PHYSICS-II
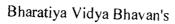   Course code: BT205

Master file.

- Question no. 1 is compulsory!
- Attempt any FOUR questions out of remaining SIX questions
- **Answers to all sub questions should be grouped together.**
- Draw diagrams wherever necessary.
- Assume suitable data if necessary and state the assumption clearly.
- Figures to the right indicate full marks.

Good luck!

Q. No		Max Mark	CO	Module no.
1	All questions compulsory	15		
(a)	Arrive at Lorentz transformation equations in Special theory of relativity using postulates of relativity.	8	CO3	V
(b)	Prove Gauss' law in differential form assuming its integral form. Also, find out the charge density ρ given $\vec{E} = kr^3\hat{r}$ (using integral form of Gauss' law) assuming spherical distribution of charges with the source charge kept at the origin.	7	CO2	IV
	Answer any four			
2				
(a)	Write a note on HCP structure explaining details about its unit cell properties.	6	CO1	I
(b)	Calculate the smallest glancing angle at which X-ray of $1.549 A^\circ$ will be reflected from crystal having a spacing of $4.255 A^\circ$. What is the highest order of reflection that can be observed?	4	CO1	II
(c)	Prove that $\vec{\nabla} \times \vec{E} = \vec{0}$ for electrostatic fields.	5	CO2	IV

3

(a)	State and explain theorem of gradient and divergence.	6	CO2	IV
(b)	A 1m rod AB is kept stationary in S' frame with end A at the origin in x'y' plane making an angle $60°$ with X axis. What would be the length of the rod in S frame, if relative speed between S and S' is 0.6c?	4	CO3	V
(c)	If an iron ring of relative permeability 900 and diameter 40cm is wound by a wire of 600 turns and there is an air gap of 5mm wide in the ring, calculate the current required to send flux of 1.5×10^{-4} Wb if area of cross section of the ring is 5.8cm^2	5	CO2	III

4

(a)	Explain the concept of length contraction and time dilation and hence prove them.	6	CO3	V
(b)	Electrons are accelerated by 844 Volts and are Bragg reflected from a crystal. The first order reflection maximum occurs at Bragg angle of $58°$. Determine the interplanar spacing.	4	CO1	II
(c)	Calculate the reluctance and mmf produced when a ring electromagnet having its mean radius 50cm, area of cross section 5cm^2, air gap 1cm wide, is excited by a current of 5A. The permeability of iron is 6×10^{-3} Wb/Am and number of turns in the coil is 900.	5	CO2	III

5

(a)	Explain hysteresis curve on the basis of domain theory.	6	CO2	III
(b)	Chromium has a BCC structure and its atomic radius is 0.1249 nm. If X-ray of wavelength 0.1787 nm is incident on its (110) plane, calculate diffraction angle for second order and planar atomic density for that plane.	4	CO1	I
(c)	Explain the construction of a Bragg's spectrometer and hence explain how the type of crystal structure can be described by the same.	5	CO1	II

6

(a)	Derive an expression for spacing between parallel planes in crystal structures in terms of their Miller indices.	6	CO1	I
(b)	Find the field outside a uniformly charged solid sphere of radius R and total charge q.	4	CO2	IV
(c)	How are continuous X-rays produced? Explain why continuous X-ray spectrum always starts from a non-zero wavelength.	5	CO1	II

7

(a)	An observer in S frame sees a pulse of light emitted from origin at t=0s, which is moving with a speed c in xy plane making an angle $\tan^{-1}(3/4)$ with the X axis. Find the position of pulse in S and S' at 2µs, assuming it to be localized in space. Calculate the velocity of the pulse in S and S' using Galilean transformations and Lorentz transformation and comment on the results. Assume that S' moves with a velocity 0.6c relative to S.	6	CO3	V
(b)	A material core has 10turns per cm of wire wound uniformly upon it which carries a current of 2A. The flux density in material is 1 Wb/m^2. Calculate the magetising force, relative permeability of the core and magnetization of the material.	4	CO2	III
(c)	Explain how diamond is formed by interpenetrating FCC lattices.	5	CO1	I

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ATKT Exam Sem II Applied Science II (Applied Physics II)

May 2016

Max. Marks: 50

Class: FY (C/M/E) **Semester:** II

Name of the Course: Applied Physics

Duration: 1 ½ Hrs.

Program: C/M/E

Course Code : FE152

- Answer any five questions out of seven.
- Figures to the right indicate full marks.
- Answers to all sub questions should be grouped together.
- Assume data (if necessary) and state the assumptions clearly!
- Diagrams have to be drawn wherever necessary.

Good luck!

Master file.

Question No		Max Marks	Course Outcome Number
Q1			
(a)	Define reluctance and mmf and hence derive a relationship between reluctance and magnetic flux for solenoid.	6	CO3
.(b)	A (111) diffraction spot from MgO crystal is produced with a Laue camera. Calculate Bragg angle θ if X-ray beam of wavelength produces second order diffraction. Given: $r_{Mg}^{+}=0.078$ nm and r_{O2}^{-} is 0.132 nm	4	CO2
Q2			
(a)	Write a short note on diamond structure explaining about its unit cell properties.	6	CO1
(b)	Find curl and divergence of the following: $x^3\hat{x} + 3xyz\hat{y} + 2z^2\hat{z}$	4	CO4
Q3			
(a)	Explain construction working of Bragg's spectrometer.	6	CO2
(b)	An iron rod 0.5m long and 2mm² cross sectional area is placed in a long solenoid of 25 turns per cm carrying current of 2A. Find magnetic moment of the bar assuming relative permeability to be 400.	4	CO3
Q4			
(a)	Prove that $\vec{\nabla}\times\vec{E} = 0$ and hence $\vec{E} = -\nabla V$	6	CO4
(b)	A crystal of iridium (Ir) is analyzed by X-ray diffraction through exposure to molybdenum Kα radiation, for which $\lambda_{K\alpha} = 0.721$ Å $= 7.21 \times 10^{-11}$m. Calculate the	4	CO1

angle of diffraction, of the lowest-index plane present in the diffractogram. The lattice constant of Ir, is 3.84 Å.

Q5			
(a)	Derive Curie Weiss law.	6	CO3
(b)	Draw important plane orientations in BCC structures and hence state their interplanar spacing ratios.	4	CO1
Q6			
(a)	Derive Gauss' law in integral and differential form.	6	CO4
(b)	Calculate current required for producing a flux of 2.7mWb due to an iron ring of cross sectional area 2.5cm^2 and 50 cm mean diameter having an air gap of 1mm. Given: relative permeability is 900 and number of turns is 400.	4	CO3
Q7			
(a)	Draw the following in simple cubic structure: $(210),[\bar{2}\bar{1}1],(\bar{3}20),[3\bar{2}2]$	6	CO1
(b)	Find $\vec{\nabla}|r|$ and hence prove that $\vec{\nabla} \times \vec{\nabla} \, function = 0$	4	CO4

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May 2016
ATKT- Exam

Max. Marks: **50**   Duration: **3.00 Hrs**
Class: **F.Y.B.Tech.**   Semester: II
Name of the Course: **Applied chemistry-II**   Course Code : **BT-106**

Instructions:
1. Question No 1 is compulsory.
2. Attempt any four questions out of remaining six.
3. Draw neat diagrams

Question No.			Maximum Marks
Q1	(a)	Explain Electrochemical or wet corrosion with its mechanism	04
	(b)	Explain Bi-metallic corrosion with example	03
	(c)	Write difference between Dry corrosion and Wet corrosion	03
Q2	(a)	Write advantages and disadvantages of powder metallurgy	04
	(b)	Write composition, properties and use of Duralumin alloy	03
	(c)	Explain alloy of lead with its properties and application	03
Q3	(a)	Define calorific value? Explain gross Net calorific value	04
	(b)	Define Fuels. Explain characteristics of good fuel	03
	(c)	Write short note on cracking	03
Q4	(a)	Write short note on Octane number	04
	(b)	Write short note on Biodiesel with its advantages	03
	(c)	Write difference between thermal and catalytic cracking	03
Q5	(a)	Explain characteristics properties of composite materials	04
	(b)	Write Difference between octane number and cetane number	03
	(c)	Calculate the % atom economy for following reaction	03
		$C_6H_6 + CH_3Cl \longrightarrow C_6H_5\text{-}CH_3 + HCl$	
Q6	(a)	Write Note on Atom economy with suitable example	04
	(b)	Describe principals of green chemistry	03

(c) Calculate the % atom economy for following reaction 03

$$CH_3-CH=CH_2 + H_2 \quad \text{---------}\rightarrow \quad CH_3-CH_2-CH_2$$

Q7 (a) Write note on anodic protection method and its advantages 04

(b) Write short note on antiknocking agents 03

(c) Calculate the % atom economy for following reaction 03

$$CH_3-CH=CH_2 + Cl_2 \quad \text{------------}\rightarrow \quad Cl-CH_2-CH=CH_2 + HCl$$