16/12/14.

F.E.C(C/M/E) Sem II - KT exam 2014.

Bharatiya Vidya Bhavan's

SARDAR PATEL COLLEGE OF ENGINEERING

(An Autonomous Institution Affiliated to University of Mumbai)

APPLIED CHEMISTRY – II FE (C/M/E) SEM II

Duration : **(50 MARKS)** KT-exam 2014

- Attempt any five questions out of seven.
- Assume any other data needed suitably if not given; but justify the same.
- Illustrate your answers with neat diagram.

MASTER FILE

Q.1 (a) Describe in detail Dry or chemical corrosion. 05

(b) Explain in detail metal cladding. 05

Q.2 (a) Explain in detail water line corrosion. 05

(b) Describe fiber reinforced composite. 05

Q.3 (a) 2.3 g of coal sample was taken for nitrogen estimation by Kjeldahl method. The NH_3 liberated required 12.5 mL of 0.5 N H_2SO_4 for neutralization. The same sample in Bomb calorimeter experiment produced 0.64 g $BaSO_4$ ppt. Calculate %N and % S for given coal sample 05

(b) Give in detail Cu alloy with their composition, properties and uses. 05

Q.4 (a) Describe in detail method of biodiesel synthesis. 05

(b) Give in detail applications of powder metallurgy. 05

Q.5 (a) 3.5 g of coal sample was taken for C and H estimation by combustion method. The increase on weight of tube containing anhydrous $CaCl_2$ and bulb containing KOH was found to be 1.75 g and 5.25 g respectively. Calculate the % C and % H in the given coal sample. 05

(b) Give any five principles of Green Chemistry. 05

Q.6 (a) Define and explain Gross and Net Calorific Value. 05

(b) 1.5 g of coal sample was taken for C and H estimation by combustion method. The increase on weight of tube containing anhydrous $CaCl_2$ and bulb containing KOH was found to be 1.25 g and 4.88 g respectively. Calculate the % C and % H in the given coal sample. 05

Q.7 (a) Give in detail proximate analysis of fuel. 05

(b) A sample of coal has the following composition by mass: C = 80%, H = 7%, O = 3%, S = 3.5%, N = 2.5% and ash = 4%. Calculate HCV and LCV in British system units for the given fuel sample using Dulong's formula 05

UD
15/14/14

Bharatiya Vidya Bhavan's

SARDAR PATEL COLLEGE OF ENGINEERING

(An Autonomous Institution Affiliated to University of Mumbai)

Total Marks : 100 FE(C/M/E), Sem- , A.T.K.T. **Second Half 2014**
Duration : 3 Hours

ATKT Examination

CLASS/SEM : F.E.(CIVIL/MECHANICAL/ELECTRICAL)

SUBJECT : APPLIED MATHEMATICS-II

- **Attempt any Five out of the given Seven questions**
- **Answers to all sub questions should be grouped together**
- **Each question has 6-6-8 marks breakup**

MASTER FILE

1. a) Find the perimeter of the loop of the curve $y^2 = x\left(1-\frac{x}{3}\right)^2$

   b) Show that the map of the real axis of the z – plane on w – plane by the transformation $w = \frac{1}{z+i}$ is a circle. Find its radius and center.

   c) Separate into real and imaginary parts $\sin^{-1}(3i/4)$

2. a) Find the perimeter of the cardiod $r = a(1-\cos\theta)$

   b) Show that: $\int_0^1 \int_0^y xy\, e^{-x^2} dx\, dy = \frac{1}{4e}$

   c) If $\cos\alpha + 2\cos\beta + 3\cos\gamma = \sin\alpha + 2\sin\beta + 3\sin\gamma = 0$, prove that $\sin 3\alpha + 8\sin 3\beta + 27\sin 3\gamma = 18\sin(\alpha+\beta+\gamma)$

3. a) Change order of integration $\int_0^4 \int_{y/2}^{9-y} f(x,y)\, dx\, dy$

   b) Find the roots common to $x^4 + 1 = 0$ and $x^6 - i = 0$

   c) If $u - v = (x-y)(x^2+4xy+y^2)$ and $f(z) = u + iv$ is an analytic function of $z = x + iy$, find f (z) in terms of z.

4. a) Change the order and evaluate $\int_0^a \int_y^{\sqrt{ay}} \frac{x}{x^2+y^2} dx\, dy$

   b) Find the bilinear transformation which maps z = 2, 1, 0 onto w = 1, 0, i

page No. 1.

c) Show that $\tan 7\theta = \dfrac{7\tan\theta - 35\tan^3\theta + 21\tan^5\theta - \tan^7\theta}{1 - 21\tan^2\theta + 35\tan^4\theta - 7\tan^6\theta}$

5. a) Change to polar coordinates and evaluate $\int_0^a \int_y^a \frac{x}{x^2+y^2}\, dy\, dx$

b) Show that $\tan\left\{i\log\dfrac{a-bi}{a+bi}\right\} = \dfrac{2ab}{a^2-b^2}$

c). Under the transformation $w = \dfrac{z-1}{z+1}$ show that the map of the straight line $x = y$ is a circle. Find its center and radius

6. a) Evaluate $\iint (x+y)^2\, dx\, dy$ over the area bounded by the ellipse $\dfrac{x^2}{a^2} + \dfrac{y^2}{b^2} = 1$

b) Prove that $\left(\dfrac{1+\tanh x}{1-\tanh x}\right)^3 = \cosh 6x + \sinh 6x$

c) Find the mass of lamina bounded by the curves $y^2 = ax$ and $x^2 = ay$ if the density of the lamina at any point varies as the square of its distance from the origin.

7. a) Find the area of the cardiod $r = a(1+\cos\theta)$

b) Evaluate $\int_0^{\log 2} \int_0^x \int_0^{x+y} e^{x+y+z}\, dx\, dy\, dz$

c) Evaluate: $\int\int\int \frac{1}{x^2+y^2+z^2}$ throughout the volume of the sphere $x^2 + y^2 + z^2 = a^2$

16/12/14

F. E. (C/M/E) Dec 2014.

Applied physics (Sem-II) - KT exam.

Bharatiya vidya bhavan's

SARDAR PATEL COLLEGE OF ENGINEERING

[An autonomous institution Affiliated to university of Mumbai]

KT-EXAMINATION FOR F.E.(C/M/E) _DEC 2014

Total marks : 50 duration : 1 hr 30 min

Subject : Applied Physics(**Sem-II**)

- Answer to all sub questions should be grouped together. Assume suitable data (if necessary) and state the assumptions clearly.
- Diagram have to be drawn wherever necessary.

Some fundamental constants MASTER FILE.

- $e=1.602 \times 10^{-19}$ C, $N_A = 6.023 \times 10^{23}$ mol^{-1}, $c = 3 \times 10^8$ m/s, $me = 9.1 \times 10^{-31}$ kg,
  $\mu_B = 9.27 \times 10^{-24}$ A-m^2, $\mu_0 = 4\pi \times 10^{-7}$ Wb/A-m, $k_B = 1.38 \times 10^{-23}$ J/K

Answer any five. **(Marks :6 +4 each)**

Q1

a) Define packing factor? And hence Calculate Atomic packing factor of body centered cubic cell and simple cubic cell ?

b) Write down the volume element in spherical polar co-ordinate system. and hence calculate volume of a sphere of radius R ?

Q2.

a) Explain 1) Reluctance.

2) Permanence.

3) Ohms law for magnetic circuits.

b) Calculate the interplanar spacing between (111) , (220) planes in FCC crystal. Given the atomic radius 1.246 A° ?

Q3.

a) Discuss Langevin's Theory of paramagnetism and hence show that

$$M = N \cdot \mu_m \cdot \left(\coth\beta - \frac{1}{\beta} \right)$$

F.E. (C/M/E) - Dec 2014.

Applied physics - sem II - KT exam.

b) A bar magnet has coercivity of $4*10^3$ A/m. It is desired to demagnetize it by inserting it inside a solenoid 12 cm long and having 60 turns what current should be sent through the solenoid ?

Q4.

a) Describe HCP crystal . obtain the relationship between c & a?

b) Compare Electrostatics and Magnetostatics.

Q5

a) How are characteristics X-ray produced? Explain characteristic spectrum X-ray ?

b) A iron ring of mean circumferential length 30 cm & cross-section 1 cm^2 is wound uniformly with 300 turns of wire . When a current of 0.032 amp flow in the winding , the flux in the ring is $2*10^{-6}$ weber. Find the flux density in the ring , magnetic intensity '& permeability of iron?

Q6

a) Give expression for divergence and curl of magnetic field and hence state biot- savart's law?

b) Calculate the smallest glancing angle at which X-ray of 1.549 A° will be reflected from crystal having a spacing of 4.255 A°. what is the highest order of reflection that can be observed?

Q7

a) State and derive bragg's law of X-ray diffraction?

b) prove that curl of electric field is null vector.

Exam
20/12/14

FE (C/M/E) II sem. Re-exam

Bharatiya Vidya Bhavan's

SARDAR PATEL COLLEGE OF ENGINEERING

(An Autonomous Institution Affiliated to University of Mumbai)

Total Marks : 100 **Duration:3Hours**

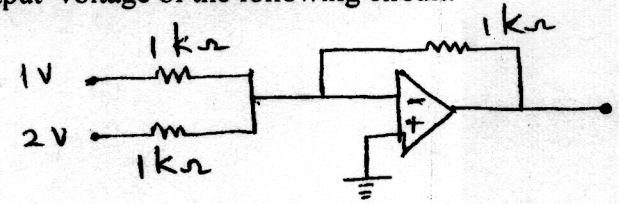
CLASS/SEM: C/M/E/ II SEM

SUBJECT: BASIC ELECTRICAL AND ELECTRONICS ENGINEERING-I

- Attempt any FIVE questions out of SEVEN questions
- Answers to all sub questions should be grouped together
- Figures to the right indicates full marks
- Assume suitable data where required

MASTER FILE.

1	a	Explain in brief avalanche breakdown and zener breakdown in PN junction diode	5
	b	Define Drain resistance,Transconductance and Amplification Factor of JFET.	5
	c	Write short notes on LEDs.	5
	d	Define current gains in CB and CE configurations.Explain how the current gains are related to each other.	5
2	a	Explain with neat diagram the working of bridge rectifier and derive an expression for transformer utilization factor.	10
	b	Find the output voltage of the following circuit.	5



	c	For a zener shunt regulator if V_z=10v,R_s=1kΩ, R_L=2kΩ and the input voltage varies from 22 to 40v find the maximum and minimum values of zener current.	5
3	a	Explain the input and output characteristics of BJT in common base mode.	10
	b	Explain the working principle and Characteristics of SCR .	10
4	a	Explain in detail a single stage CE Amplifier with the neat diagram.	10
	b	Explain construction and working of JFET.	10

FE(C/M/E) II sem - Basic Electrical & Electronics Engg-II (Pre-exam)

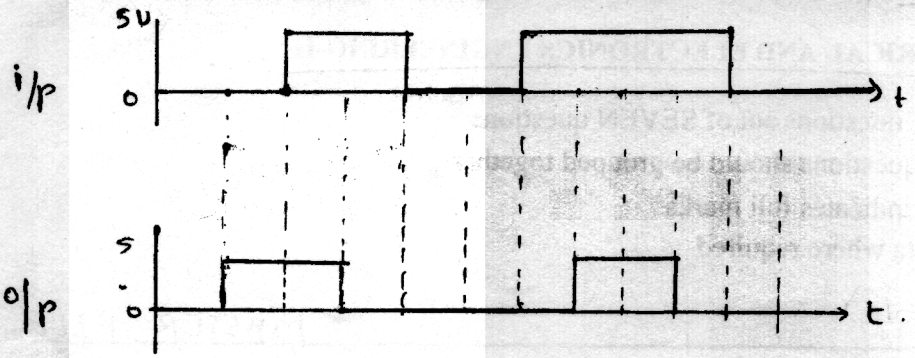
5 a Explain universal gates. 6

b Prove the following using boolean algebra theorems. Also draw the simplified logic circuit 4+2

$\bar{A}\bar{B}\bar{C} + \bar{A}B\bar{C} + A\bar{B}\bar{C} + AB\bar{C} = \bar{C}$

$\overline{(AB+\bar{C})(\bar{A}+\bar{B}+C)} = (\bar{A}+\bar{B}+\bar{C}).(A+B+C)$

c Voltage waveforms at two inputs are given below.Determine the output of AND,OR,NAND and EX-OR gate if these inputs are given to each of them 8



6 a Explain operational amplifier as an adder and voltage follower. 10

b With zener diode characteristic and neat circuit explain zener diode as a voltage regulator. 10

7 a Derive the expression for the voltage gain of an op-amp as inverting amplifier.. 10

b Compare BJT and FET. 5

c Explain Early effect in transistors 5

FE(C/M/E), sem - II, A.T.K.T. lib 17/12/14

Bharatiya Vidya Bhavan's

SARDAR PATEL COLLEGE OF ENGINEERING

(An Autonomous Institution Affiliated to University of Mumbai)

KT_Exam/Dec'2014

Total Marks :100 Duration : 3 Hours

CLASS/SEM : F.E.(C/M/E) II SUBJECT: COMPUTER PROGRAMMING

- Attempt any FIVE out of SEVEN questions.
- Answers to all sub questions should be grouped together.
- Figures to the right indicate full marks.
- Explain with suitable diagrams and examples where ever necessary.

MASTER FILE.

Q.1 a) Explain the following with example: (20)

i) switch statement

ii) if-else statement

iii) for loop

iv) do while loop

v) continue

Q.2 a) Explain in brief (any two) (10)

(i) Computer structure
(ii) Algorithm (take any example of your choice)
(iii) Flowchart (take any example of your choice)

b) Explain the following terms (10)

(i) Keywords
(ii) Constants
(iii) Variables
(iv) Identifier

Q.3 a) Explain call by value and call by reference by taking suitable examples. (10)

b) Write a program using functions to find the given year is a leap year or not a leap year. (10)

F.E. (C/M/E) II , A.T.K.T.

Computer Programming. 17/12/14.

Q.4 a) Write a program to sort an array of numbers in ascending order using selection sort . Also explain the concept of selection sort. (10)

b) Write a program to check whether the entered string is a palindrome or not without using strrev() function. (10)

Q.5 a) Write a program to add two complex numbers using operator overloading. (08)

b) How can we access private data members from outside the class? Explain with suitable example. (06)

c) Write a program to explain the concept of virtual function. (06)

Q.6 a) What is operator overloading? Explain the multiplication operator (*) overloading by taking a suitable example. (10)

b) What do you mean by Inheritance? Explain in brief the different types of the inheritance. (10)

Q.7 Attempt any three… (20)

(i) Copy constructor

(ii) Inline function.

(iii) Compile and run time Polymorphism.

(iv) Write a program to print the pattern

```
* * * *
* * *
* *
*
```

(v) Features of Object Oriented programming.

FE (C/M/E), Sem-II, A.T.K.T.

Lib
19/11/14

Bharatiya Vidya Bhavan's

SARDAR PATEL COLLEGE OF ENGINEERING

(An Autonomous Institution Affiliated to University of Mumbai)

December 2014
Duration : 3 Hours

Total Marks : 100
CLASS/SEM : FE (C/E/M) SEM II
SUBJECT : ENGINEERING MECHANICS - II

- Attempt any FIVE questions out of SEVEN questions.
- If there are sub questions, **answers to all sub questions should be grouped together**.
- Figures to the right indicate full marks.
- Assume suitable data if necessary and state the same clearly.

MASTER FILE

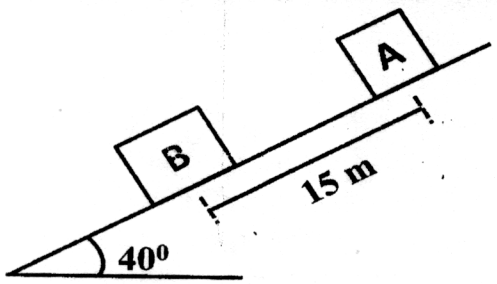
Q.1 (a) The motion of a particle along a straight line is given by $s = t^3 - 3t^2 - 2t + 5$, where s is the displacement in meters and t is time in seconds. Determine (10)

(i) the velocity and acceleration after 4 seconds
(ii) maximum or minimum velocity and the corresponding displacement.
(iii) Time at which velocity is zero.

Q.1 (b) A stone is dropped from the top of a tower. When it has fallen a distance of 10m, another stone is dropped from a point 38 m below the top of the tower. If both the stones reach the ground at the same time, calculate (10)

(i) the height of the tower and
(ii) the velocity of the stones when they reach the ground.

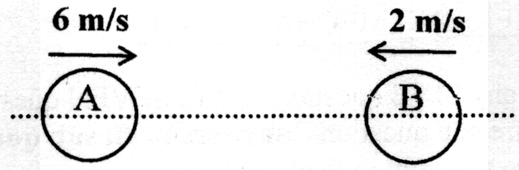
Q.2 (a) Two blocks A of mass 20 kg and B of mass 8 kg are released from rest on a 40° incline when they are 15 m apart, as shown in figure below. If the coefficient of friction between the block A and the incline is 0.10 and that between the block B and the incline is 0.4, find the time elapsed until the blocks touch each other. (10)



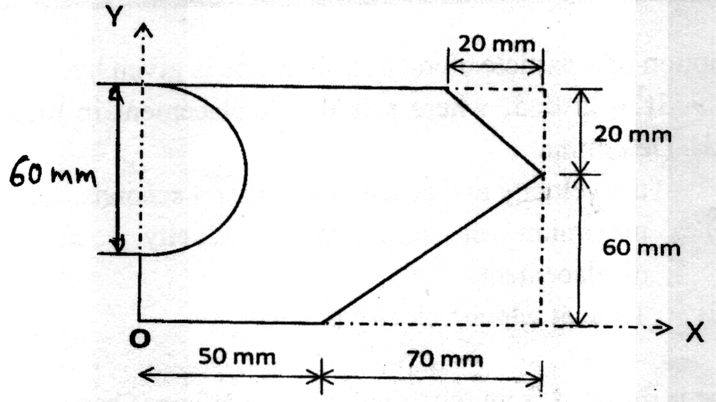
F.E. (C/M/E) Sem II, AJ-KJ 19/12/14.

Engineering Mechanics-II

Q.2 (b) Two smooth balls A and B of mass 5 kg and 8 kg respectively are moving along a straight line towards each other with velocities as shown in the figure below. Assuming e = 0.6, determine the velocity of each ball after the impact. Also find the loss of kinetic energy. (10)



Q.3 (a) Find the centroid of the area shown in figure below. (10)

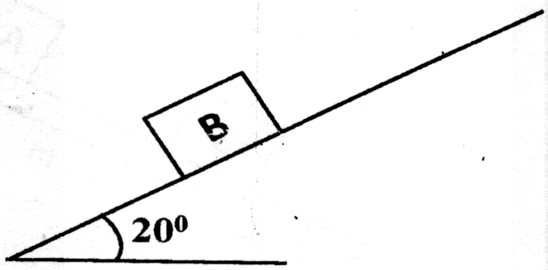


Q.3 (b) Find the moment of inertia of the area shown in figure above for Q. 3 (a), about X and Y axes. (10)

Q.4 (a) A block B of mass 10 kg is projected up an incline as shown in figure below with a velocity of 10 m/s. If $\mu = 0.3$, find (10)

(i) the maximum distance that the block will move up along the plane

(ii) the velocity of the package when it comes back to the initial position from where it is projected.



F.E. C(IM|E) Sem II, A.T.K.T

Engineering Mechanics - II 19|12|14.

Q.4 (b) A pile of mass 2250 kg is driven a distance of 75 mm into the ground by the blow of a hammer of mass 500 kg falling through a height of 1.5m onto the pile. Find the resistance of the ground to penetration assuming it to be constant. Assume the impact between the hammer and the pile to be plastic. (10)

Q.5 (a) An aeroplane is flying in the horizontal plane with a velocity of 400 km/hr and at a height of 2500 m. When it is vertically above the point A on the ground, a stone is dropped from it. The stone strikes the ground at point B. Calculate the distance AB. Also find the velocity of the stone at B and the time taken to reach B. Neglect air resistance. (07)

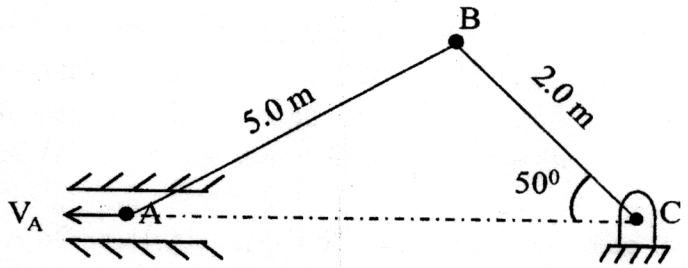
Q.5 (b) Two ships leave the port at the same time. Ship A is travelling West at 42 km/hr. Ship B is travelling North at 24 km/hr. Find the relative velocity of ship A with respect to ship B. Also find the distance between them after 30 minutes. (08)

Q.5 (c) State and Explain Impulse momentum principle (05)

Q.6 (a) i) State and Explain D'Alembert's principle. (04)

ii) State and Explain Work-Energy principle. (04)

Q.6 (b) A slider mechanism is shown in figure below. Arm BC has an angular velocity of 3 r/sec clockwise when $\theta = 50^0$. Find the angular velocity of AB and the velocity of points A and B. (12)



Q.7 (a) A sphere and a cylinder each having the same mass and radius are released from rest on an inclined plane of angle 40°. If each one of them rolls down the inclined plane without slipping, compare the accelerations of their mass centres. (10)

Q.7 (b) A body performing a simple harmonic motion has a velocity of 10 m/s when the displacement is 40 mm and a velocity of 4 m/s when the displacement is 80 mm, the displacement being measured from the mid-point. Calculate the frequency and amplitude of the motion. What is the acceleration when the displacement is 60 mm? (10)