

I B. Tech I Semester Supplementary Examinations, May/June - 2017**ENGINEERING CHEMISTRY**

(Com. to CE, ME, CHEM, AE, AME, BOT, MM, MET, PE, PCE)

Time: 3 hours

Max. Marks: 70

-
- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answering the question in **Part-A** is Compulsory
3. Answer any **FOUR** Questions from **Part-B**
- ~~~~~

PART -A

1. a) How FRPs are different compared to normal composite materials? (2M)
- b) What are reversible and irreversible cells? (2M)
- c) Explain pitting corrosion. (2M)
- d) Define superconductor. Give examples. (2M)
- e) What is meant by caustic embrittlement? (2M)
- f) Define aniline point. (2M)
- g) Write the applications of lubricants. (2M)

PART -B

2. a) What is polymerization? Explain the different types of polymerizations with examples. (8M)
- b) What are the advantages of vulcanized rubber? (6M)
3. a) What is meant by cracking? Explain any cracking process for synthesis of petrol. (8M)
- b) Differentiate petrol knocking and diesel knocking. (6M)
4. a) Discuss electrochemical theory of corrosion. (8M)
- b) Write notes on (i) sacrificial anodic corrosion (ii) standard hydrogen electrode (6M)
5. a) Explain any two methods of green synthesis. (8M)
- b) What are fullerenes? Mention the properties of fullerenes. (6M)
6. a) Write a note on sterilization of water. (8M)
- b) Explain hot and cold lime soda process for softening of hard water. (6M)
7. a) Explain the various processes involved in manufacture of cement. (8M)
- b) Write notes on electrical insulators. (6M)



I B. Tech I Semester Supplementary Examinations, May/June - 2017
MATHEMATICS-II
(Mathematical Method)
 (Com. to CSE, IT, AGE)

Time: 3 hours

Max. Marks: 70

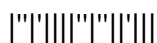
- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
 2. Answering the question in **Part-A** is Compulsory
 3. Answer any **FOUR** Questions from **Part-B**

PART -A

1. a) Explain about successive approximation method. (2M)
- b) What is meant by inverse interpolation? (2M)
- c) Evaluate $\int_0^{\pi/2} e^{\sin x} dx$ using Simpson's 1/3 rule. (2M)
- d) The Fourier series of the function $f(x)$ in the interval $a < x < b$ is given by (2M)
 $f(x) = \frac{a_0}{2} + \sum (a_n \cos n\theta + b_n \sin n\theta)$ where $\theta = \frac{2\pi x}{a+b}$. Find a_n
- e) For what values of the constant k is $u_{xx} + ku_{xy} + u_{yy} = 0$ elliptic? Parabolic? (2M)
 Hyperbolic?
- f) Find the Fourier transform of $f(x) = \begin{cases} \frac{1}{2a}, & |x| \leq a \\ 0, & |x| > a \end{cases}$. (2M)
- g) Evaluate $\int_0^1 \frac{dx}{1+x^2}$ by Trapezoidal rule. (2M)

PART -B

2. a) By using method false position, find the root of the equation $\cos x - xe^x = 0$. (8M)
- b) Find the value Newton's iterative formula to \sqrt{N} . (6M)
3. a) Find the parabola passing through points (0, 1), (1, 3) and (3, 55) using (8M)
 Lagrange's interpolation formula.
- b) Given that $\sqrt{12500} = 111.8034$, $\sqrt{12510} = 111.8481$, $\sqrt{12520} = 111.8928$, (6M)
 $\sqrt{12530} = 111.9375$. Find $\sqrt{12516}$.
4. a) Find the successive approximate solution of the differential equation (14M)
 $y' = y$, $y(0) = 1$ by Picard's method.
- b) Tabulate $y(0.1)$ using Runge-Kutta method given data $y^1 = y^2 + x$, $y(0) = 1$.
5. a) Find the half-range cosine series for $f(x) = x(2-x)$ in $0 \leq x \leq 2$ and hence find sum (8M)
 of the series $\frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \dots$
- b) Find the Fourier series for $f(x) = \begin{cases} 1+x, & -\pi \leq x < 0 \\ 0, & 0 < x \leq \pi \end{cases}$ (6M)
6. The points of trisection of a string are pulled aside through the same distance on (14M)
 opposite sides of the position of equilibrium and the string is released from rest.
 Derive an expression for the displacement of the string at subsequent time and
 show that the mid-point of the string always remains at rest.
7. a) State and prove Fourier integral in complex form. (5M)
- b) Find the inverse Fourier sine transform $f(x)$ of $F_s\{p\} = \frac{e^{-ap}}{p}$ and hence deduce (9M)
 $F_s^{-1}\{1/p\}$.



I B. Tech I Semester Supplementary Examinations, May/June - 2017
MATHEMATICS-II
(Numerical Methods and Complex Variables)
 (Com. to ECE, EIE, E.Com.E)

Time: 3 hours

Max. Marks: 70

- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
 2. Answering the question in **Part-A** is Compulsory
 3. Answer any **FOUR** Questions from **Part-B**

PART -A

1. a) Give formula to find a reciprocal of a number using Newton-Raphson method. (2M)
- b) Define: (i) Averaging operator μ (ii) shift operator E. (2M)
- c) The value of $\int_1^2 \frac{dx}{x}$ by Simpson's $\frac{1^{rd}}{3}$ rule (taking $n = 4$) is ____ (2M)
- d) State orthogonality of legendre's polynomials. (2M)
- e) Using Cauchy's theorem evaluate $\int_C \frac{e^{2z}}{z-2} dz$ where C is $|z| = 1$. (2M)
- f) Determine the poles of the function $f(z) = \frac{z}{\cos z}$. (2M)
- g) Define Isolated singularity with example. (2M)

PART -B

2. a) Solve $x = 1 + \tan^{-1} x$ by iteration method. (7M)
- b) Using Newton Raphson method, find the root of the equation $f(x) = e^x - 3x$ that lies between 0 and 1. (7M)

3. a) Following are the measurements T made on a curve recorded by the oscillograph representing a change of current I due to a change in the conditions of an electric current (7M)

$T:$	1.2	2.0	2.5	3.0
$I:$	1.36	0.58	0.34	0.20

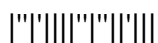
Using Lagrange's formula find I at $T = 1.6$.

- b) State appropriate interpolation formula which is to be used to calculate the value of $e^{1.75}$ from the data and hence evaluate it. (7M)

x	1.7	1.8	1.9	2.0
$y = e^x$	5.474	6.050	6.686	7.389



4. a) Evaluate $\int_0^1 \sqrt{1+x^3} dx$ taking $h = 0.1$ using Simpson's $\frac{1}{3}$ rule. (7M)
- b) Using Runge-Kutta method find $y(0.2)$ for the equation $\frac{dy}{dx} = \frac{y-x}{y+x}$, $y(0) = 1$ take $h = 0.2$. (7M)
5. a) Evaluate $\int_0^2 (8-x^3)^{1/3} dx$ using $\beta - \Gamma$ functions. (7M)
- b) Show that $(1-2xt+t^2)^{-1/2} = \sum_{n=0}^{\infty} P_n(x)t^n$. (7M)
6. a) Find the conjugate harmonic of $u = e^{x^2-y^2} \cos 2xy$. Hence find $f(z)$ in terms of z . (7M)
- b) Let C be closed contour described in the positive sense. (7M)
- Let $g(a) = \int_c \frac{z^3+2z}{(z-a)^3} dz$. Show that $g(a) = 6\pi ia$ if a is within c and $g(a) = 0$ when a is outside C .
7. a) Find the Laurent series of the function $f(Z) = \frac{z}{(z+1)(z+2)}$ about $z = -2$. (7M)
- b) Find the residue of $\int_c \frac{z^2}{1-z^4} dz$ at these singular points which lie inside the circle $|z| = 1.5$. (7M)



I B. Tech I Semester Supplementary Examinations, May/June - 2017**ENGINEERING PHYSICS**

(Com. to ECE, EEE, EIE, Bio-Tech E, E.Com.E, AGE)

Time: 3 hours

Max. Marks: 70

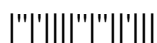
- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
 2. Answering the question in **Part-A** is Compulsory
 3. Answer any **THREE** Questions from **Part-B**

PART -A

1. a) State the conditions for sustained interference. (4M)
- b) Explain spontaneous absorption and stimulated emission. (4M)
- c) Show that superconductor is a perfect diamagnetic (3M)
- d) State the Stokes and Gauss divergence theorems. (4M)
- e) Discuss band theory of solids. (3M)
- f) What are drift and diffusion currents in a semiconductor? (4M)

PART -B

2. a) With the help of a neat diagram describe the experimental arrangement to produce Newton's rings by reflected light. Prove that the diameter of dark rings is proportional to the square root of the natural numbers. (8M)
- b) Explain the terms i) Acceptance cone ii) Numerical aperture (4M)
- c) Discuss the properties of ferromagnetic materials. (4M)
3. a) What is meant by atomic packing factor? Calculate atomic packing factor for SC, BCC and FCC structures. (8M)
- b) What is diffraction? Explain clearly the difference between interference and diffraction. (4M)
- c) Discuss the drawbacks of classical free electron theory. (4M)
4. a) Explain the construction and working of He-Ne laser with the help of energy level diagram. (8M)
- b) Derive the expression for the electrical conductivity of a material using quantum free electron theory. (8M)
5. a) Write a note on i) Solar cell ii) LED (8M)
- b) Explain various factors affecting architectural acoustics and discuss their remedies. (8M)
6. a) Derive an expression for the density of energy states. (8M)
- b) Discuss different types of polarisations in dielectrics. (8M)
7. a) What is Hall effect? Deduce an expression for Hall coefficient. (8M)
- b) Write any four applications of Hall effect. (4M)
- c) Calculate the energies that can be possessed by a particle of mass 8.50×10^{-31} kg which is placed in an infinite potential box of width 10^{-9} cm. (4M)



I B. Tech I Semester Supplementary Examinations May/June - 2017**ENGINEERING MECHANICS**

(Com. to CE, ME, CSE, PCE, IT, CHEM, AE, AME, MM, PE, MTE, TE)

Time: 3 hours**Max. Marks: 70**

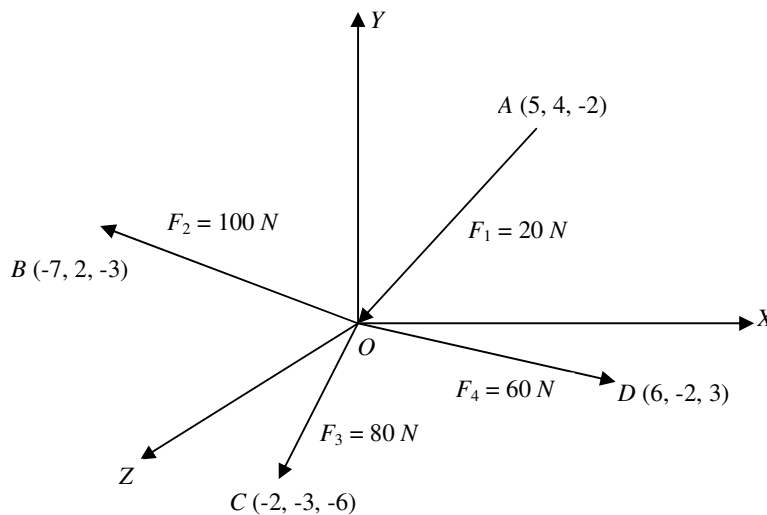
Question Paper Consists of **Part-A** and **Part-B**
 Answering the question in **Part-A** is Compulsory,
 Three Questions should be answered from **Part-B**

PART-A

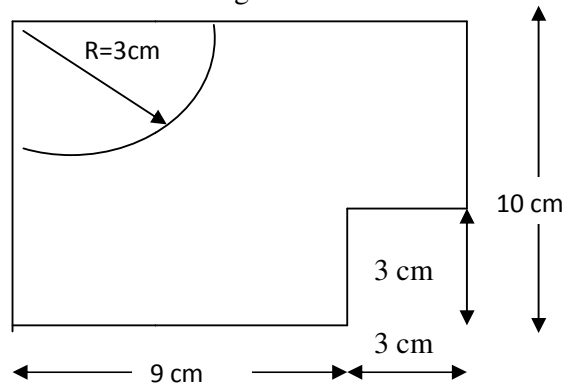
1. a) What is angle of repose? Explain.
- b) State the conditions for a particle to be equilibrium in space.
- c) Derive the centroid of a circle.
- d) Explain the importance of parallel axis theorem.
- e) What is general plane of motion? Give examples.
- f) Explain the applications of Impulse momentum equation.

PART-B

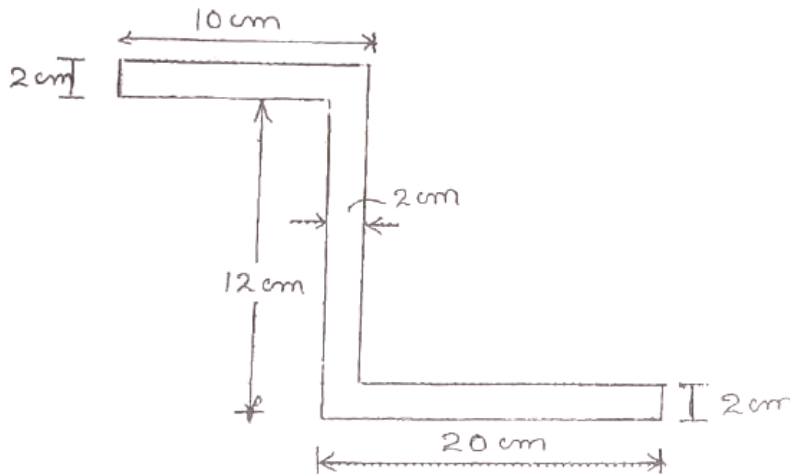
2. Five forces of magnitude 50 kN, 60 kN, 70 kN, 80 kN and 90 kN acting at a point respectively and keep it in equilibrium. The angle made by the forces is 0° , 30° , 110° , 180° and 270° . Find the magnitude and direction of the resultant force.
3. Find the resultant of the space concurrent forces shown in below Figure. Find also the magnitude and direction cosines. What are the scalar components of the resultant along the X, Y and Z axes?



4. Locate the centroid of the lamina given below.



5. Find the moment of inertia about the centroidal X-X and Y-Y axis of the given Z section.



6. a) The rectilinear motion of a particle is given by the relation $x = t^3 - 60t$, where x is in metres and t is in seconds. Calculate i) velocity when $t = 6$ s ii) average velocity over the 8th second
 - b) A car starts from rest moves on a curved road of 300 m radius and accelerated at a constant tangential acceleration to 1 m/s^2 . Find the time and distance when total acceleration becomes 2 m/s^2 .
7. Explain work energy method and impulse momentum method with suitable examples.

