Code: 1GC13

R-11/R-13

B.Tech. I Year Supplementary Examinations Nov/Dec 2016
Engineering Chemistry
(Common to All Branches)

Max. Marks: 70   Time: 3 Hours
Answer *any* **five** questions
All Questions carry equal Marks (**14 Marks** each)
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1. a) Discuss, in brief, the boiler corrosion. How is it controlled?   6M
    b) Write short notes on
        (i) Phosphate Conditioning
        (ii) ion-exchange process   8M

2. a) Calculate the emf of the cell : Ni / Ni^{2+} (IM) // Pb^{2+} (IM) / Pb at 25°C.   Write
        down its cell reactions. Standard electrode potential of nickel and lead are -
        0.24 V and -0.13 V respectively at 25°C.   7M
    b) What are insulators? Give the various engineering applications of insulators.   7M

3. a) Discuss the role of nature of oxide layer formed in oxidation corrosion. State
        and explain Pilling – Bed worth Rule.   8M
    b) Give reasons for the following :
        (i) Corrosion of water-filled tank occurs below the waterline
        (ii) A Copper equipment should not possess a small Steel bolt   6M

4. a) Differentiate between addition polymerization and condensation polymerization
        with suitable examples.   6M
    b) Describe the method of preparation, properties and applications of the following
        (i) Bakelite   8M
        (ii) Nitrile Rubber

5. a) What are explosives? Explain the manufacture and applications of dynamite.   6M
    b) What is meant by lubricant? Explain the properties of lubricants such as
        viscosity and aniline point.   8M

6. a) Draw a neat labelled phase diagram of water system and explain areas, curves
        and triple point in it.   8M
    b) Define the terms : Phase, Component and Degree of freedom used in phase
        rule.   6M

7. a) Describe, in brief, the manufacture of metallurgical coke by Otto Hoffman's
        oven method.   7M
    b) Calculate the minimum weight of air required for complete combustion of 1 kg
        of fuel containing : C = 90 %, H = 3.5 %, O = 3.0 %, S = 0.5 %, H$_2$O = 1.0 %,
        N = 0.5% and ash = rest.   7M

8. a) What is a refractory material? Write a detail note on acid and basic refractories
        and their uses.   7M
    b) Write the chemical reactions that take place during setting cement and explain.   7M

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B.Tech. I Year Supplementary Examinations Nov/Dec 2016
Mathematical Methods
(Common to CSE & IT)

Max. Marks: 70

Time: 3 Hours

Answer *any* **five** questions

All Questions carry equal Marks (**14 Marks** each)

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1. a) Reduce the matrix $A = \begin{bmatrix} 5 & 6 & 7 & 8 \\ 6 & 7 & 8 & 9 \\ 11 & 12 & 13 & 14 \\ 16 & 17 & 18 & 19 \end{bmatrix}$ to canonical form. Hence find its rank.

    7M

    b) Solve the system of equations

    $x + 2y + (2+k)z = 0$; $2x + (2+k)y + 4z = 0$; $7x + 13y + (18+k)z = 0$ for all values of k.

    7M

2. a) Find the Eigen values and Eigen vectors of the matrix $A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$.

    7M

    b) Verify Cayley-Hamilton theorem for the matrix $A = \begin{bmatrix} 3 & 2 & 4 \\ 4 & 3 & 2 \\ 2 & 4 & 3 \end{bmatrix}$ and hence find its inverse.

    7M

3. a) Prove that the Eigen values of a Skew-Hermitian matrix are purely imaginary or zero.   7M

    b) Reduce the quadratic form $x_1^2 + 3x_2^2 + 3x_3^2 - 2x_2 x_3$ into canonical form and also write the nature of the quadratic form.

    7M

4. a) Explain the Bisection method to find the roots of the equation $f(x) = 0$.

    4M

    b) Using Newton's forward formula compute $f(142)$ from the following table:

x	140	150	160	170	180
$f(x)$	3.685	4.854	6.302	8.076	10.225

    5M

    c) Using Lagrange's formula, express the function $\dfrac{x^2 + 6x - 1}{(x^2 - 1)(x - 4)(x - 6)}$ as a sum of partial fractions.

    5M

5. a) Derive the normal equations to fit a quadratic $y = a_0 + a_1 x + a_2 x^2$ to the data $(x_i, y_i), i = 1, 2, \dots n$.

    5M

    b) By the method of least squares, find the straight line that best fits the following data:

x:	1	2	3	4	5
y:	14	27	40	55	68

    5M

    c) Transform the equation $y = ab^x$ to a linear form.

    4M

6. a) Derive the formulae for computing the values of $\dfrac{dy}{dx}$ and $\dfrac{d^2y}{dx^2}$ at any point, from Newton's forward difference interpolation formula. 7M

   b) Compute the value of $\displaystyle\int_{0.2}^{1.4} \left(\sin x - \log x + e^x\right) dx$ using Simpson's $\dfrac{3}{8}$ th rule. 7M

7. a) Find the value of y at $x = 0.1$ by Picard's method, given that

   $\dfrac{dy}{dx} = \dfrac{y-x}{y+x}, \quad y(0) = 1.$ 7M

   b) Using the fourth order Runge – Kutta formula, find $y(0.2)$ and $y(0.4)$ given

   that $\dfrac{dy}{dx} = \dfrac{y^2 - x^2}{y^2 + x^2}$, $y(0) = 1.$ 7M

8. a) Obtain the Fourier series $f(x) = \left(\dfrac{f - x}{2}\right)^2$ in the interval $0 < x < 2\pi$. Deduce that

   $\dfrac{1}{1^2} + \dfrac{1}{2^2} + \dfrac{1}{3^2} + \dfrac{1}{4^2} + \cdots\cdots = \dfrac{f^2}{6}.$ 9M

   b) Express $f(x) = x$ as a half-range cosine series in $0 < x < 2$. 5M

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B.Tech. I Year Supplementary Examinations Nov/Dec 2016
Engineering Physics
(Common to All Branches)

Max. Marks: 70   Time: 3 Hours

Answer *any* **five** questions
All Questions carry equal Marks (**14 Marks** each)
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1. a) Distinguish between interference and diffraction of light. 3M

   b) Explain the formation of Newton's rings with necessary theory. 8M

   c) Find the thickness of half wave plate for a light beam of wavelength 600nm, if the difference in the refractive indices of E and O rays is 0.125. 3M

2. a) State and explain Bragg's Law for X-ray diffraction. 4M

   b) Describe the basic crystal systems based on lattice parameters 7M

   c) Find the maximum wavelength of X-rays which can be diffracted by a crystal with interplanar spacing of $2.5A^0$ in first order diffraction. 3M

3. a) Define Heisenberg's uncertainty principal. 2M

   b) Derive Schrodinger's one dimensional time independent wave equation for a free particle. 8M

   c) Explain various sources of electrical resistance in the case of metals. 4M

4. a) Distinguish between drift and diffusion of charge carriers in a semiconductor. 3M

   b) Explain the formation of p-n junction in a semiconductor with necessary theory. 7M

   c) Explain the construction and working principle of LED. 4M

5. a) What are soft and hard magnetic materials. 3M

   b) Derive Clausius-Mosotti relation for a polarized dielectric. 7M

   c) Explain the concept of hysteresis for ferromagnetic material. 4M

6. a) Mention the significance of penetration depth on superconductor. 3M

   b) Describe the construction and working of He-Ne laser with neat diagrams 7M

   c) Explain BCS theory of superconductivity. 4M

7. a) Describe graded index optical fiber along with its refractive index   profile. 4M

   b) Describe the various important components of optical fiber communication system. 7M

   c) Mention the important applications of holography. 3M

8. a) Explain the basic principal factors influencing nanomaterial Properties. 4M

   b) Describe Sol-Gel method of synthesis of nanomaterials. 6M

   c) Mention the significant properties of Carbon nanotubes. 4M

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B.Tech. I Year Supplementary Examinations Nov/Dec 2016
Mathematics-I
(Common to All Branches)

Max. Marks: 70   Time: 3 Hours

Answer *any* **five** questions
All Questions carry equal Marks (**14 Marks** each)
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1. a) Solve the differential equation $x\dfrac{dy}{dx}+y=x^{3}\,y^{6}$ 4M

   b) Find the equation of the system of orthogonal trajectories to the family of
       curves $r^{n}\sin n_{n}=a^{n}$, where a is parameter   4M

   c) The temperature of a body drops from 100℃ to 75℃ in ten minutes when
       the surrounding air is at 20℃. What will be the temperature after half an
       hour? When will, the temperature be 25℃   6M

2. a) Solve the differential equation $(D^{3}+2D^{2}+D)\,y=e^{2x}+x^{2}+x+\sin 2x$ 7M

   b) Solve by the method of variation of parameters, $(D^{2}-2D)\,y=e^{x}\sin x$ 7M

3. a) If $a<b$, prove that $\dfrac{b-a}{1+b^{2}}<\tan^{-1}b-\tan^{-1}a<\dfrac{b-a}{1+a^{2}}$ using Lagrange's

       mean value theorem and hence deduce that $\dfrac{f}{4}+\dfrac{3}{25}<\tan^{-1}\dfrac{4}{3}<\dfrac{f}{4}+\dfrac{1}{6}$ 7M

   b) A rectangular box open at the top is to have a volume of 32 cubic feet.
       Find the dimensions of the box requiring least material for its construction.   7M

4. a) Trace the curve, $a^{2}\,y^{2}=x^{2}\,(a^{2}-x^{2})$ 7M

   b) Find the volume formed by the revolution of the loop of the curve
       $y^{2}\,(a+x)=x^{2}\,(3a-x)$ about the $x-$ axis.   7M

5. a) Evaluate $\iint\limits_{R}xy\,dxdy$ where R is the region bounded by x – axis, ordinate

       x = 2a , and the curve $x^{2}=4ay$ 7M

   b) By changing the order of integration, evaluate $\displaystyle\int\limits_{0}^{3}\int\limits_{1}^{\sqrt{4-y}}(x+y)\,dxdy$ 7M

6. a) Obtain the Laplace transform of the function $f(t)=\begin{cases}(t-1)^{2} & ,t>1 \\ 0 & ,0<t<1\end{cases}$ 7M

   b) Using convolution theorem, evaluate $L^{-1}\left\{\dfrac{1}{s\,(s^{2}+2s+2)}\right\}$ 7M

7.   Solve the differential equation $\dfrac{d^{2}x}{dt^{2}}-4\dfrac{dx}{dt}-12x=e^{3t}$ given that

       $x(0)=1\;and\;x'(0)=-2$ using Laplace transforms   14M

8. a) Using line integral, calculate the work done by the force,
       $\overline{F}=(3x^{2}-6yz)\,\bar{i}+(2y+3xz)\,\overline{j}+(1-4xyz^{2})\overline{k}$ in moving a particle from the
       point (0,0,0) to the point (1,1,1) along the curve $C:\;x=t\;,\;y=t^{2}\;,z=t^{3}$ 7M

   b) Verify greens theorem in the plane for $\oint\limits_{C}(3x^{2}-8y^{2})\,dx+(4y-6xy)\,dy$ where

       C is the region bounded by $y=\sqrt{x}\;and\;y=x^{2}$ 7M

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B.Tech. I Year Supplementary Examinations Nov/Dec 2016
Programming in C and Data Structures
(Common to CSE & IT)

Max. Marks: 70   **Time: 03 Hours**

Answer *any* **five** questions
All Questions carry equal marks (14 Marks each)
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1. a) Explain the steps involved in creating and executing the c program.   8M
    b) Give the structure of c program.   6M

2. a) Write a C program to display Fibonacci series for a given number   7M
    b) What are pre-test and post-test loops? Explain them with examples.   7M

3. a) How single dimensional arrays and multidimensional arrays are declared and
        initialized? Explain with suitable examples.   6M
    b) What are the library functions related to mathematical operations? List them.
        For atleast five functions give the general syntax.   8M

4. a) How pointers permit inter function communication   7M
    b) Write a program to find whether a given string is palindrome or not.   7M

5. a) What is Structure? Explain about self referential structures.   7M
    b) Explain about fseek() function in detail.   7M

6. a) Describe the infix, postfix and prefix expressions with examples.   6M
    b) Define stack. Explain the push and pop operations of stack.   8M

7.   Discuss the insertion and deletion operations of a singly linked list.   14M

8.   Define sorting. Explain with an example the merge sort technique   14M

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B.Tech. I Year Supplementary Examinations Nov/Dec 2016
Engineering Drawing
(Common to EEE, ECE, CSE & IT)

Max. Marks: 70   Time: 3 Hours

Answer *any* **five** questions
All Questions carry equal Marks (**14 Marks** each)
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1. a) The major and minor axis of an ellipse is 120&80 mm. Draw an ellipse by arcs of circles method.   7M

   b) The asymptotes of a hyperbola are inclined at 700 to each other. Construct the curve when a point p on it is at a distance of 20 mm and 30 mm from the two asymptotes   7M

2. A circle of 60 mm diameter rolls without slipping on the outside of another circle of diameter 150 mm. Show the path of a point on the periphery of the (generating)rolling circle, diametrically opposite to the initial point of contact between the circle   14M

3. a) A line CD measures 80mm is inclined at an angle of 300 to HP and 450 to VP. The point C is 20mm above HP and 30mm in front of VP. Draw the projections of the line.   7M

   b) Draw the projections of a line JK 70 mm long and touching both HP and VP. It is inclined at 400 to HP and 350 to VP.   7M

4. a) A hexagonal plane of side 30 mm is perpendicular to V.P and Parallel to H.P One of its side is perpendicular to V.P. Draw its projections   7M

   b) A circular lamina of 30 mm radius is perpendicular to V.P and its diameter AB is inclined at 450 to H.P Draw its projections   7M

5. a) Draw the projections of cylinder of base 40 mm diameter, axis 50mm long, resting on ground on its base.   7M

   b) Draw the projections of a hexagonal pyramid axis 60 mm long, base 30 mm side having base on the ground and one of edges of base inclined at 450 to V.P.   7M

6. Draw the isometric projection of a rectangular prism of base 50 mm X40 mm and height 75 mm , when it rest with its base on H.P. and one of its rectangular faces is parallel to V.P.   14M

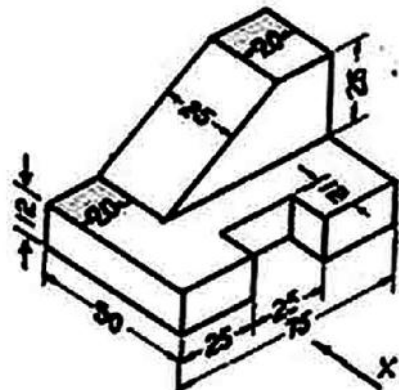7. Draw the elevation, plan and left and right side views of the part shown in the figure.1.(dimensions are in mm).

Figure. 1   14M

8. The orthographic views of an object using the first angle projection method are shown in the FIGURE-2 . Draw the isometric projection.
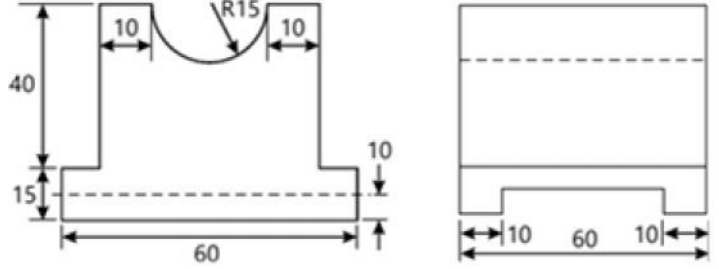

Figure 2   14M
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