Hall Ticket Number :										

R-14

Code: 4GC13

B.Tech. I Year Supplementary Examinations Nov/Dec 2019

Engineering Chemistry

(Common to All Branches)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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UNIT–I

1. a) Differentiate temporary and permanent hardness of water.

   b) Write about methods for the treatment of portable water?

OR

2. What are boiler troubles? How are they caused? Give suggestions to minimize the troubles.

UNIT–II

3. Discuss the mechanism of dry corrosion with suitable examples.

OR

4. Discuss the phenomenon of electroplating with suitable examples.

UNIT–III

5. a) What is synthetic rubber? Write any five draw backs of raw rubber?

   b) Explain the synthesis, mechanism and applications of carbohydrates

OR

6. a) Describe doped conducting polymers with suitable example.

   b) Write a note on vulcanization of rubber.

UNIT–IV

7. a) Write a note on production and uses of producer gas, water gas and Bio gas.

   b) Define knocking? Write about octane number?

OR

8. Calculate the gross and net calorific value of a coal sample from the data obtained from bomb calorimeter weight of coal 0.73gms, weight of the water in calorimeter 1500gms, water equivalent of calorimeter 470gms, initial temperature 25^0C and final temp 28^0C , % of H_2 2.5% and latent heat of steam 587 cal/gm.

UNIT–V

9. a) What are lubricants? Write any three properties and applications of lubricants.

   b) What are refractories? Discuss any three properties of refractories?

OR

10. What are viscosity and viscosity index of lubricating oil? Discuss the functions of lubricants

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Hall Ticket Number :										

R-14

Code: 4GC12

B.Tech. I Year Supplementary Examinations Nov/Dec 2019

Engineering Physics

(Common to All Branches)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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UNIT–I

1. a) Explain the construction and working of He – Ne laser 8M

   b) Newton's rings are observed in the reflected light of wave length 5900 Å. The diameter of 10th dark ring is 0.5 cm. Find the radius of curvature of the lens used. 6M

OR

2. a) Discuss the point to point optical fiber communication system and mention its advantages over the conventional communication systems 8M

   b) The angle of acceptance of an optical fiber is 30^0 when kept in air. Find the angle of acceptance when it is in a medium of refractive index 1.33. 6M

UNIT–II

3. a) Derive Bragg's law for X-ray diffracton 8M

   b) Copper has fcc structure of atomic radius 0.1278 nm. Calculate the interplanar spacing for (3 2 1) plane. 6M

OR

4. a) What is space lattice? Describe briefly the seven systems of crystals 7M

   b) Explain the various detection methods for ultrasonics. 7M

UNIT–III

5. a) Setup time-independent Schrodinger wave equation in one dimension and explain Eigen function and Eigen values 7M

   b) Define Fermi energy and Fermi factor. Discuss the probability of occupation of electrons when $E<E_f$ and $E>E_f$. 7M

OR

6. a) What is wave function? Give its physical significance and properties 8M

   b) Find the relaxation time of conduction electrons in a metal of resistivity 1.54×10^{-8} ohm-m, if the metal has 5.8×10^{28} conduction electrons per m^3. 6M

UNIT–IV

7. a) Describe with suitable diagrams the construction and action of a P-N junction diode 8M

   b) Give a brief account of high temperature superconductivity 6M

OR

8. a) Describe in short the formation of energy bands in solids and hence explain how it helps to classify materials into conductors and insulators 8M

   b) The Hall co-efficient of a material is -3.68×10^{-5} m^3 /C. What is the type of charge carriers? Also calculate the carrier concentration. 6M

UNIT–V

9. a) Explain magnetic hysteresis on the basis of domain theory 7M

   b) Explain in detail any two applications of nanotechnology 7M

OR

10. a) Discuss the applications of hard and soft magnets 7M

    b) Explain the synthesis of nanomaterials using sol-gel method 7M

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Hall Ticket Number :										

R-14

Code: 4GC14

B.Tech. I Year Supplementary Examinations Nov/Dec 2019

Mathematics-I

(Common to All Branches)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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UNIT–I

1. a) Solve $x\frac{dy}{dx}+y=\log x$ 7M

   b) Solve $y''-y'-2y=3e^{2x},\ y(0)=0,\ y'(0)=-2$ 7M

OR

2. a) Solve $\frac{dy}{dx}-\frac{2y}{x}=\frac{5x^2}{(2+x)(3-2x)}$ 7M

   b) Solve $\left(D^3+2D^2+D\right)y=e^{2x}+x^2+x+\sin 2x$ 7M

UNIT–II

3. a) Verify Lagrange's mean value theorem for $f(x)=\log_e x$ in $[1,e]$ 7M

   b) Given that $x+y+z=a$, find the minimum value of $x^m y^n z^p$ 7M

OR

4. a) Prove that $\frac{®}{6}+\frac{1}{5\sqrt{3}}<\sin^{-1}\left(\frac{3}{5}\right)<\frac{®}{6}+\frac{1}{8}$ 7M

   b) If $x=r\sin^{-}\cos¤, y=r\sin^{-}\sin¤, z=r\cos^{-}$, show that $\frac{\partial(x,y,z)}{\partial(r,^{-},¤)}=r^2\sin^{-}$ and find $\frac{\partial(r,^{-},¤)}{\partial(x,y,z)}$ 7M

UNIT–III

5. a) Trace the curve $y^2=(x-2)(x-3)^2$ 7M

   b) Change the order of integration and evaluate $\int_0^{4a}\int_{\frac{x^2}{4a}}^{2\sqrt{ax}} dydx$ 7M

OR

6. a) Trace the curve $x=a(^{-}+\sin^{-}), y=a(1-\cos^{-})$ 7M

   b) Evaluate $\int_0^1\int_0^{\sqrt{1-x^2}}\int_0^{\sqrt{1-x^2-y^2}}(xyz)\,dzdydx$ 7M

UNIT–IV

7. a) Find the Laplace transform of $\frac{e^{-at}-e^{-bt}}{t}$ 7M

b) Using Laplace transform, solve $\left(D^2+4D+5\right)y=5$, given that $y(0)=0, y^{//}(0)=0$ 7M

OR

8. a) Evaluate $L\left\{\frac{1-\cos t}{t}\right\}$ 7M

b) Using Convolution theorem, find $L^{-1}\left\{\frac{s}{\left(s^2+a^2\right)^2}\right\}$ 7M

UNIT–V

9. a) (i) If $\bar{f}=(x+3y)\bar{i}+(y-2z)\bar{j}+(x+pz)\bar{k}$ is solenoidal, find p.

(ii) Find curl $\bar{f}$ where $\bar{f}=grad\left(x^3+y^3+z^3-3xyz\right)$. 7M

b) Evaluate by Green's theorem $\int_c (y-\sin x)\,dx+(\cos x)\,dy$ where 'c' is the triangle enclosed by the lines $y=0, x=\frac{\pi}{2}, \pi y=2x$ 7M

OR

10. a) Evaluate $\nabla.\left(\frac{\bar{r}}{r^3}\right)$ where $\bar{r}=x\bar{i}+y\bar{j}+z\bar{k}$ and $r=|\bar{r}|$ 7M

b) If $\bar{f}=\left(2x^2-3z\right)\bar{i}-2xy\bar{j}-4x\bar{k}$ then evaluate $\iiint_v \nabla.\bar{f}\,dv$ where 'v' is the closed region bounded by $x=0, y=0, z=0, 2x+2y+z=4$ 7M

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