Total No. of Questions : 12]

SEAT No. :

P3560

[Total No. of Pages : 4

[4857] - 131

S.E. (Production) (Production Sandwich)

HEAT & FLUID ENGINEERING

(2008 Pattern)

Time : 3 Hours] *[Max. Marks : 100*

Instructions to the candidates:

1) ***Answer to the two sections should be written in separate answer books.***
2) ***Neat diagrams must be drawn whenever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of Mollier chart, steam table and electronic pocket calculator is allowed.***
5) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) State and prove Pascal's Law. **[8]**

b) A plate of 0.025 mm distance from a fixed plate, moves at 60 cm/s and requires a force of 2 N/m^2 to maintain this speed. Determine the fluid viscosity between them. **[10]**

OR

Q2) a) Define the following terms : **[8]**

i) Metacentre.

ii) Metacentric height.

iii) Newton's Law of viscosity.

iv) Capillarity.

b) Determine the total pressure on a circular plate of diameter 1.5 m which is placed vertically in water in such a way that centre of plate is 3 m below the free surface of water. Find the position of centre also. **[10]**

P.T.O.

Q3) a) Derive an expression for Discharge through Venturimeter. **[6]**

b) The water is flowing through a tapering pipe having diameter 300 mm & 150 mm at section 1 & 2 respectively. The discharge through pipe is 40 lit/s. The section 1 is 10 m above datum and section is 6 m above the datum. Find intensity of pressure at section 2 if that section 1 is 400 KN/m^2. **[10]**

OR

Q4) a) State and Prove Bernoulli's equation. **[6]**

b) An oil of specific gravity 0.8 is flowing through a Venturimeter having inlet diameter 20 cm & throat diameter 10 cm, the oil-mercury differential manometer shows the reading of 25 cm. Calculate the discharge of oil through horizontal venturimeter. Take C_d = 0.98. **[10]**

Q5) a) Derive Darcy Weisbatch equation for head loss due to friction. **[8]**

b) Explain with neat sketch construction and working of Centrifugal Pump. **[8]**

OR

Q6) a) Explain with neat sketch construction and working of Pelton turbine. **[6]**

b) Explain the following terms : **[10]**

i) Reynolds number

ii) Froude number

iii) Euler number

iv) Mach number

v) Dimensional homogeneity.

SECTION - II

Q7) a) With neat sketch explain construction and working of Cocharan Boiler. **[8]**

b) Define following properties of lubricants : **[10]**

i) Viscosity

ii) Flash point

iii) Fire point

iv) Cloud point

v) Pour point.

OR

Q8) a) Compare Boiler mountings and accessories with their function. **[8]**

b) What is energy balance for boiler? Explain it with necessary equation. Draw Heat balance sheet. **[10]**

Q9) a) Compare central and unit air conditioning system. **[6]**

b) Define and explain following terms. **[10]**

i) Dry bulb temperature

ii) Wet bulb temperature

iii) Dew point temperature

iv) Specific humidity

v) Saturated air.

OR

Q10) a) Define Air conditioning, list various application of air conditioning. **[8]**

b) Describe with neat sketch the operation of Air refrigeration system working on Bell Coleman cycle. **[8]**

Q11) a) Explain battery ignition system and compare it with magneto ignition system for IC engine. **[8]**

b) Explain the following IC engine system with neat sketch. **[8]**

i) Lubrication system

ii) Cooling system.

OR

Q12) a) Define the following : **[8]**

i) Indicated power

ii) Break power

iii) Break thermal efficiency

iv) Mechanical efficiency.

b) What is multistage compressor? Advantages of multistage. **[8]**

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Total No. of Questions : 12]

SEAT No. :

P3561

[Total No. of Pages : 3

[4857]-152
S.E. (Electrical)
MATERIAL SCIENCE
(2008 Course) (Semester - I) (203141)

Time : 3 Hours] *[Max. Marks : 100*

Instructions to the candidates:

1) ***Attempt three questions from each section.***

2) ***Figures to the right indicate full marks.***

Physical Constants:

1. Angstrom Unit(AU) = 1×10^{-10} metres
2. Boltzmann's Constant (k) = 1.380×10^{-23} joule.degree -1
3. Charge on Electron (e) = 1.601×10^{-19} coulomb
4. Mass of Electron (m) = 9.107×10^{-31} kg
5. Electron volt (eV) = 1.602×10^{-19} joules
6. Mass of Proton (m_p) = 1.627×10^{-27} kg
7. Velocity of light (c) = 2.998×10^{8} m/sec
8. Dielectric Constant of free space (ε_0) = 8.854×10^{-12} F/m
9. Permeability of free space (μ_0) = $4\pi \times 10^{-7}$ H/m
10. Debye Unit = 3.33×10^{-30} coulomb.metre

SECTION - I

Q1) a) Explain polar and non-polar dielectric materials with examples and diagrams. **[8]**

b) State different types of Photoelectric cells. Describe with neat diagram, construction and working of photoconductive cell. **[8]**

OR

Q2) Write short note on **[16]**

a) Piezoelectric materials

b) Dielectric loss tangent

P.T.O.

Q3) a) Define following with units **[8]**

i) Primary Ionization

ii) Secondary Ionization of Gases

iii) Breakdown Voltage

iv) Breakdown Strength

b) Write a short note on crystal defects. **[9]**

OR

Q4) a) Write down properties and applications **[8]**

i) Ceramics

ii) Varnish

b) Write insulating materials used in Insulators and Transformers. **[9]**

Q5) a) Derive Curie and Weiss law for Ferro-magnetic materials. Hence explain spontaneous magnetisation. **[9]**

b) Write a short note on Compact Disc. **[8]**

OR

Q6) a) Write a short note on magnetic tape recorders. **[8]**

b) Differentiate between Permeability & Magnetic Susceptibility. Hence derive relationship between two. **[9]**

SECTION - II

Q7) Write down properties and application of following: **[16]**

a) Carbon

b) Copper Alloys

c) Brass and Bronze

d) Material used for Solders

OR

Q8) Write a short note on **[16]**

a) Thermal Bimetal

b) Superconductors

Q9) a) Write a short note on BN Nanotubes and Nano wires. **[9]**

b) Write a short note on -Carbon Nano-structures and Carbon Clusters. **[9]**

OR

Q10)a) Explain in brief energy bands in insulators, semiconductors and conductors. **[9]**

b) Write a short note on Single Electron Transistor (SET). **[9]**

Q11)a) With a neat sketch describe method of Measurement of Dielectric Strength of Solid insulating Material as per IS 2584. **[8]**

b) Describe method of measurement of tan delta of Liquid Insulating material. **[8]**

OR

Q12) a) Describe measurement of flux density with Gauss meter. What is the principle of operation of Gauss meter. **[8]**

b) Explain various tests conducted on high voltage bushing. **[8]**

Total No. of Questions : 8]

SEAT No. :

P3562

[Total No. of Pages : 3

[4857] - 161A

S.E. (E & TC / Electronics)

SIGNALS & SYSTEMS

(2008 Pattern)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume suitable data, if necessary.***

Q1) a) Refer fig. 1 & find an even & odd part of CT signal. **[4]**

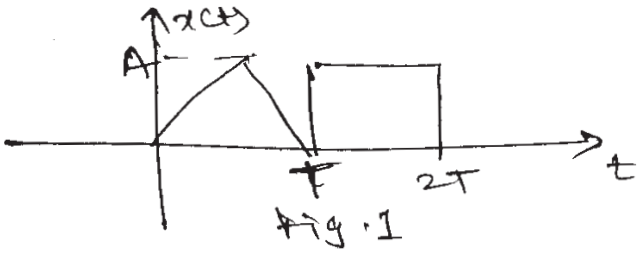

Fig. 1

b) The signals x(t) is shown in fig.2. Find the mathematical expression of signal & perform the following operations. **[2]**

$x(t) + 1$

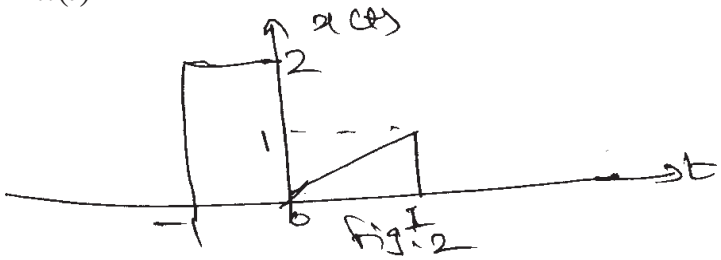

Fig. 2

c) Compute the convolution integral using graphical method for **[6]**

$x(t) = e^{-t}$ for $t \geq 0$

$h(t) = u(t)$

OR

P.T.O.

Q2) a) Find whether the following signal is energy or a power signal & find energy & the power of the signal. **[3]**

$$x(t) = 6, \quad \text{for} \frac{-1}{2} \le t \le \frac{1}{2}$$

b) Compute the linear convolution of the following by analytical method. **[6]**

$$x[n] = \left\{ 0, \underset{\uparrow}{\frac{1}{3}}, \frac{2}{3}, 1, \frac{4}{3}, \frac{5}{3}, 2 \right\} \&$$

$$h[n] = \left\{ 1, 1, \underset{\uparrow}{1}, 1, 1 \right\}$$

c) Whether the following continuous time system is $y(t) = x(2t)$. **[3]**

i) Linear or non linear ii) Static or dynamic

Q3) a) State & prove the time shifting & time scaling property of Fourier Transform. **[6]**

b) Find the Fourier Transform of the following waveform in fig.3. **[6]**

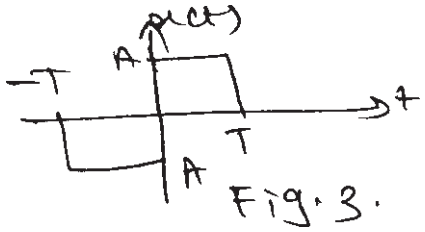

Fig. 3.

OR

Q4) a) Find the inverse Laplace transform of **[6]**

$$F[s] = \frac{3s + 7}{s^2 - 2s - 3} \text{ if Roc is } s > 3.$$

b) Find the Laplace transform of the following functions. **[6]**

i) $x(t) = e^{-at} \quad u(t)$

ii) $x(t) = e^{-at} \sin w_c t \; u(t)$

Q5) a) Define energy spectral density & explain the properties of ESD. **[7]**

b) Find auto correlation of the x[n] = {0, 1, 2, 3}. **[6]**

OR

Q6) a) Find the cross correlation equation of the following signals. **[7]**

$x_1[n] = \{4, 3, 2, 1\}$ & $x_2[n] = \{2, -1, 1, 3\}$

b) State & prove the relation between auto correlation & PSD. **[6]**

Q7) a) Define CDF & PDF & state the properties for the same. **[6]**

b) Suppose a certain random variable has the CDF. **[7]**

$$F_x(x) = \begin{cases} 0 & x \le 0 \\ kx^2 & 0 \le x \le 10 \\ 100k & x > 10 \end{cases}$$

Evaluate k, write the corresponding PDF & Find the values of P(X ≤ 5) & P(5 < X ≤ 7)

OR

Q8) a) In a random experiment a trail consists of three successive tosses of coin. If we define a random variable X as the number of heads appearing in a trail. Determine P(X = *x*i) & CDF $F_x(X)$. **[7]**

b) Explain Binomial & Gaussion Distribution Function. **[6]**

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