R-19   **Code : 19CE2101**

B.TECH. DEGREE EXAMINATION, APRIL 2021
II B.Tech I Semester

STRENGTH OF MATERIALS
(Civil Engineering)

Time: 3 hours   Max. Marks: 60

*Answer **SIX** Questions, Choosing **ONE** Question from each section*
All Questions carry equal marks
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SECTION - I

1 (a) Define the following terms.
(i) Modulus of Rigidity   (ii) Poisson's ratio
(iii) Young's modulus   (iv) Bulk modulus   (v) The relation between above all.

(b) A bar of 30 mm diameter is subjected to a pull of 60 KN. The measured extension on a gauge length of 200 mm is 0.1 mm and change in diameter is 0.004 mm, calculate:
(i) Young's modulus
(ii) Poisson's ratio
(iii) Bulk modulus
(iv) modulus of rigidity

2 (a) Derive the relationship between modulus of elasticity and modulus of rigidity and bulk modulus.

(b) A steel rod of 4 cm diameter is enclosed centrally in a hollow copper tube of external diameter 5 cm and internal diameter of 4 cm. the composite bar is then subjected to an axial pull of 60 kN. If the length of each bar is equal to 200 mm, determine:
(i) The stresses in the rod and the tube, and
(ii) Load carried by each bar.
Take $E_s = 2.1 \times 10^5$ N/mm^2 $E_c = 1.1 \times 10^5$ N/mm^2.

SECTION - II

3. (a) Derive an expression for the stresses on an oblique plane of a rectangular body when the body is subjected to two normal stresses along with a complementary shear stress.

(b) A circular bar of 50 mm diameter is subjected to an axial load of 30 kN. Determine the normal and shear stresses on a plane which is inclined at an angle of 30^0 with axis of the bar?

4. (a) Describe the Mohr's circle of stresses.

(b) A rectangular block of material is subjected to a tensile stress of 100 N/mm^2 on one plane and a tensile stress of 60 N/mm^2 on a plane at right angles to the plane carrying 100 N/mm^2. Each of the above stresses is accompanied by a complementary shear stress of 40 N/mm^2. Find the magnitude of principal stresses, position of principal planes and maximum shear stress?

SECTION - III

5. (a) A cantilever of length 3m carries an UDL of 20 kN/m over the entire span and two point loads 10KN and 15KN at a distance 2m and 3m from fixed support. Draw FD and BMD.

    (b) Derive the relation between shear force, bending moment and rate of loading in simply supported beam.

6. (a) Define shear force, bending moment and point of contraflexure.

    (b) A simply supported beam of span 6m carries point loads of 10kN and 15kN at a distance of 2m and 4m from the left end along with a udl of intensity 10 kN/m for full span. Draw the shear force and bending moment diagrams for the beam.

SECTION - IV

7. (a) State the assumptions made in theory of simple bending.

    (b) Derive the equation of pure bending.

8. A beam having rectangular section 350mm x 500mm is used over a span of 5m. The safe longitudinal and shear stresses in the beam material are 20 N/mm^2 and 8 N/mm^2 respectively. Determine the maximum value of UDL which the beam can carry over its entire length.

SECTION - V

9. (a) Derive the expressions for hoop and longitudinal stresses in thin cylindrical vessel.

    (b) A thin cylinder of internal diameter 1.0 m contains a fluid at an internal pressure of 5 N/mm^2. Determine the maximum thickness of the cylinder if:
    (i) The longitudinal stress is not to exceed 50 N/mm^2.
    (ii) The circumferential stress is not to exceed 65 N/mm^2

10. (a) What are the assumptions made in Lame's theory, and derive Lames theorem and its equations for any thick cylindrical shell.

    (b) Determine the maximum and minimum hoop stress across the section of a pipe of 400 mm internal diameter and 100 mm thick, when the pipe contains a fluid at a pressure of 10 N/mm^2. Also sketch the radial pressure distribution and hoop stress distribution across the section.

SECTION - VI

11. A shaft transmits 300 kW power at 120 rpm. Determine. The necessary diameter of solid circular shaft. And also calculate the necessary diameter of hollow circular section, the inside diameter being 2/3 0f external diameter. The allowable shear stress is 70 N/mm^2. Taking the density of material is 77 kN/mm^3 calculate the percentage saving in the material if hollow shaft is used.

12. (a) Derive an expression for deflection of a close coiled helical spring subjected to a axial load of W.

    (b) A closely coiled helical spring made of 10 mm diameter steel wire has 15 coils of 100 mm mean diameter. The spring is subjected to an axial load of 100 N. Calculate,
    (i) Maximum shear stress induced
    (ii) Deflection

B.TECH. DEGREE EXAMINATION, APRIL 2021

II B.Tech. I Semester

SURVEYING

(Civil Engineering)

Time: 3 hours   Max. Marks: 60

*Answer **SIX** Questions, Choosing **ONE** Question from each section*
All Questions carry equal marks
* * *

SECTION – I

1   (a)   Explain the principles of chain surveying?

   (b)   What do you understand by well-conditioned triangle? Why is it necessary to have triangles in a chain surveying?

2   (a)   Describe the survey field book and show how the field measurements are entered in it? How is chain survey plotted?

   (b)   Define the term offset? What are different types of offsets?

SECTION – II

3   (a)   Define the terms axis of Telescope, height of Instrument, GTS Benchmark and datum surface.

   (b)   During a fly leveling operation, the following observations were made:
                    Back sight-0.650, 1.405, 2.655, 2.435m
                    Fore sight – 2.455, 1.305, 0.555, 2.405m
   The first backsight was taken on a BM of RL 90.50m. From the last backsight, it is required to set four pegs at a distance of 30m on a falling gradient of 1 in 100. Calculate the RLs of these four pegs.

4   (a)   Draw a contour map (not to scale) and represent the following features on it.
                    (i) Natural water course   (ii) Hill top   (iii) Valley line

   (b)   What do you mean by interpolation of contours? Explain arithmetical method of interpolation of contours.

SECTION – III

5   (a)   Describe the conditions under which tacheometric surveying is advantageous.

   (b)   A   tacheometer fitted with stadia wires 4 mm apart has its object glass (f = 200 mm) fixed at a distance of 250 mm form the trunnion axis. From the first principles establish the tacheometeric distance equation if the stadia intercept is 'S'.

6   (a)   The following are the fore and back bearings of the sides of a closed traverse:

Side	FB	BB
AB	$150^0 15^1$	$330^0 15^1$
BC	$20^0 30^1$	$200^0 30^1$
CD	$295^0 45^1$	$115^0 45^1$
DE	$218^0 0^1$	$38^0 0^1$
EA	$120^0 30^1$	$300^0 30^1$

Calculate the interior angles of the traverse.

(b)   Derive rules to calculate reduced bearing from whole circle bearing for all the Quadrants.

SECTION - IV

7   (a)   List out different general methods of determining areas. Explain how the areas are computed by sub-division into triangles. What are the limitations of the method?

(b)   What are the different elements of a simple curve? With the help of neat sketches, derive the expressions for the elements of a simple curve.

8   (a)   Two tangents AB and BC intersect at a point B at chainage 150.5m. Calculate the necessary data for setting out a circular curve of radius 100m and deflection angle 30^0 by the method of offsets from the long chord.

(b)   Explain the detailed procedure of finding out the capacity of a reservoir.

SECTION - V

9   (a)   Discuss briefly advantages of total Station.

(b)   List out various input data to be given for distance measurement with total station.

10   (a)   Illustrate about various segments of GPS?

(b)   Explain about errors in surveying with GPS.

SECTION - VI

11   (a)   Illustrate the detailed procedure of setting out works for bridges.
     (b)   Describe about the process of tunnel alignment.

12   (a)   Explain the procedure of locating centers of bridge piers.

(b)   Describe the process of performing underground surveys.

B.TECH. DEGREE EXAMINATION, APRIL 2021
II B.Tech. I Semester
FLUID MECHANICS
(Civil Engineering)

Time : 3 hours

Max Marks: 60

Answer SIX Questions, Choosing ONE Question from each section
All Questions carry equal marks
* * *

SECTION - I

1 (a) Calculate the specific weight, density and specific gravity of one liter of a liquid which weights 7 N.

(b) State and Prove the Pascal's law.

2 (a) State Newton's law of viscosity. Distinguish between (i) Newtonian and Non-Newtonian fluids (ii) Real fluids and Ideal fluids.

(b) Differentiate between U-tube differential manometers and inverted U-tube differential manometers.

SECTION - II

3 Derive an expression for total pressure and the depth of centre of pressure from free surface of liquid of an inclined plane surface submerged in the liquid.

4 (a) Define the following terms.
(i) Buoyancy (ii) centre of buoyancy (iii) meta-centre (iv) meta-centric height

(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 2 m below the free surface of water. Find the position of centre of pressure also.

SECTION - III

5 (a) Distinguish between; (i) Uniform flow and non uniform flow (ii) Compressible flow and incompressible flow.

(b) The velocity potential function for a two-dimensional flow is $\Phi = x(2y-1)$. Determine the velocity and the value of stream function Ψ at the point P (4,5).

6 (a) Discuss about velocity potential function and stream function.

(b) A 25 cm diameter pipe carries oil of sp.gr 0.9 at a velocity of 3 m/s. At another section the diameter is 20 cm. Determine the velocity at this section and also mass rate of flow of oil.

SECTION - IV

7 (a) Derive the Euler's equation of motion.

   (b) Determine the height of a rectangular weir of length 6 m to be built across a rectangular channel. The maximum depth of water on the upstream side of the weir is 1.8 m and discharge is discharge is 2000 litres/s. Take $C_d = 0.6$ and neglect end contractions.

8 (a) A pipe of diameter 400 mm carries water at a velocity of 25 m/s. the pressures at the points A and B are given as 29.43 N/cm^2 and 22.563 N/cm^2 respectively while the datum head at A and B are 28 m and 30 m. Determine the loss of head between A and B.

   (b) Classify the orifices based on their size, shape of the cross sectional areas, the shape of the upstream edge of the orifices and the nature of discharge.

SECTION - V

9 (a) Obtain expression for head loss in a sudden contraction in the pipe.

   (b) The difference in water surface levels in two tanks, which are connected by three pipes in series of lengths 300 m, 170 m and 210 m and of diameters 300 mm, 200 mm and 400 mm respectively, is 12 m. Determine the rate of flow of water if co-efficient of friction are 0.005,0.0052 and 0.0048 respectively, neglecting minor losses.

10 (a) Explain terms (i) Hydraulic Gradient Line and (ii) Total Energy Line

    (b) Determine the head lost due to friction in a pipe of diameter 300 mm and length 50 m, through which water is flowing at a velocity 3 m/s using Darcy formula. Take kinematic viscosity = 0.01 stokes.

SECTION - VI

11 Derive an expression for the velocity distribution for viscous flow through a circular pipe. Also sketch the velocity distribution and shear stress distribution across a section of the pipe.

12 (a) Define the terms: viscosity, kinematic viscosity, velocity gradient and pressure gradient.

    (b) Determine (i) the pressure gradient (ii) the shear stress at the two horizontal parallel plates and (iii) the discharge per meter width for the laminar flow of oil with a maximum velocity of 2 m/s between two horizontal parallel fixed plates which are 100 mm apart. Given $\mu = 2.4525$ N s/m^2.

B.TECH. DEGREE EXAMINATION, APRIL 2021
II B.Tech I Semester

ANALOG & DIGITAL ELECTRONICS
(Electrical & Electronics Engineering)

Time: 3 hours   Max. Marks:60

*Answer **SIX** Questions, Choosing **ONE** Question from each section*
All Questions carry equal marks
* * *

SECTION – I

1 (a) With the help of a neat circuit diagram, input and output waveforms, describe the operation of Half-wave rectifier.

   (b) Derive the expressions for ripple factor and maximum efficiency of HWR.

2   Draw the circuit diagram of CE amplifier using hybrid parameters and derive the expression for A_I , A_V, R_i and R_O

SECTION – II

3 (a) Explain the operation of JFET. Sketch and explain the drain characteristics.

   (b) Compare BJT and JFET.

4   With neat sketches explain the construction , principle of operation , and characteristics of an n-channel enhancement MOSFET.

SECTION – III

5   Draw the basic circuit and small-signal model of Common drain FET amplifier. Derive the expressions for voltage gain and output resistance.

6   Draw and explain the feedback concept with neat diagram and write the merits of feedback system.

SECTION – IV

7   Convert the following
        a) $(4390)_{10}$ = (   )$_2$
        b) $(1001001)_2$ =(   )$_{10}$
        c) $(11010011)_2$ =(   )$_{16}$
        d) $(572)_8$ =(   )$_{16}$
        e) $(2AC5)_{16}$ =(   )$_{10}$

8 (a) Simplify the following function using K-map method :
        $f = \sum m (0,1,2,3,4,6,9,10) + d (7,11,12,13,15)$.

   (b) Realize NOT, OR, AND gates using NAND gates.

SECTION - V

9   (a)   Implement the following Boolean function using 8:1MUX.
           f(A,B,C,D)=(0,1,3,6,9,10)+d(7,11,15)

    (b)   Explain the operation of decimal adder.

10 (a)   Deduce the design procedure for sequential logic circuits and give the classification
           of sequential logic circuits .

    (b)   Explain the realization of SR flip-flop, JK flip-flop using D flip-flop.

SECTION - VI

11   Design a MOD-12 ripple counter.

12   Explain the operation of universal shift register.

B.TECH. DEGREE EXAMINATION, APRIL 2021
II B.Tech I Semester

ENGINEERING MATHEMATICS - III
(Common for CE, EEE, ECE & ME)

Time: 3 hours   Max. Marks: 60

Answer SIX Questions, Choosing ONE Question from each section
All Questions carry equal marks
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SECTION - I

1 (a) Solve the linear system by Gauss Elimination
$x - y + z = 0$, $-x + y - z = 0$, $10y + 25z = 90$, $20x + 10y = 80$.

   (b) Solve the system of equations
$4x_1 + x_2 + x_3 = 2$, $x_1 + 5x_2 + 2x_3 = -6$, $x_1 + 2x_2 + 3x_3 = -4$ by using the Gauss-Seidel iteration method.

2 (a) Solve the system $3x_1 + 5x_2 + 2x_3 = 8$, $8x_2 + 2x_3 = -7$, $6x_1 + 2x_2 + 8x_3 = 26$
by LU-Factorization method.

   (b) Solve the system of Non linear equations $x^2 - y^2 = 4$ and $x^2 + y^2 = 16$ by Newton Raphson Method with the approximation $x_0 = y_0 = 2.828$. Carry out two iterations.

SECTION - II

3 (a) Given that $\dfrac{dy}{dx} = 2 + \sqrt{xy}$, $y(1) = 1$.

Find $y(2)$ in steps of **0.2** using the Euler's method.

   (b) Using Picard's successive approximation solve the initial value problem
$\dfrac{dy}{dx} = x^2 + y^2$, $y(0) = 0$,find $y(0.4)$.

4 (a) Use the Taylor series method to get solutions to $\dfrac{dy}{dx} = x + y - xy$, $y(0) = 1$
at $x = 0.1$ and $x = 0.5$. Use terms through x^5.

   (b) Using the fourth order R– K formula, find $y(0.2)$ *and* $y(0.4)$ given that
$\dfrac{dy}{dx} = e^x - 1$, $y(0) = 0$.

SECTION - III

5 (a) Use Cauchy's integral formula to evaluate $\displaystyle\oint_C \frac{e^{3iz}}{(z+\pi)^3} dz$ where C is the circle
$|z - \pi| = 3$.

   (b) Evaluate $\displaystyle\int_0^{3+i} z^2 \, dz$ along the paths the real axis to 3 and then vertically to $3 + i$.

6   (a)   Find the analytic function $f(z) = u + iv$ where $v = e^x \sin y$.

      (b)   Use Cauchy's integral formula to evaluate $\oint_C \dfrac{\sin \pi z^2 + \cos \pi z^2}{(z-1)(z-2)} dz$ where C is the circle $|z| = 3$.

SECTION - IV

7   (a)   Find Taylor's expansion of $f(z) = \sin z$ about the point $z = \dfrac{\pi}{4}$.

      (b)   Use residue theorem to evaluate $\displaystyle\int_0^{2\pi} \dfrac{d\theta}{5 - 3\sin\theta}$.

8   (a)   Evaluate $\oint_C \dfrac{z^2 - 2z}{(z+1)^2(z^2+4)} dz$ where C is The Circle $|z| = 10$.

      (b)   Find the Laurent series of $f(z) = \dfrac{(z^2 - 4)}{(z+1)(z+4)}$, for $1 < |z| < 4$.

SECTION - V

9   (a)   Find (i) $Z\left\{\cos\left(\dfrac{n\pi}{2} + \dfrac{\pi}{4}\right)\right\}$

            (ii) $Z^{-1}\left\{\dfrac{z^2}{(z-1)(z-3)}\right\}$, by use convolution theorem.

      (b)   Solve the difference equation $y_{n+2} + 6y_{n+1} + 9y_n = 2^n$ with $y_0 = 0, y_1 = 0$ by using Z-transform.

10   (a)   (i) Find the Z-transform of $\cos n\theta$ and $\sin n\theta$.

            (ii) $Z^{-1}\left\{\dfrac{z^2}{(z-a)^2}\right\}$, by use convolution theorem.

      (b)   Solve the difference equation $y_{n+2} + 4y_{n+1} + 3y_n = 2^n$ with $y_0 = 0, y_1 = 1$ by using Z-transform.

SECTION - VI

11   (a)   A discrete random variable X has the following probability distribution

Value of X	0	1	2	3	4	5	6
$P(X = x)$	k	$3k$	$5k$	$7k$	$9k$	$11k$	$13k$

           (i) Find the value of 'k'.
           (ii) Find $P(X < 4), P(3 < X \le 6)$ and $P(X \ge 5)$
           (iii)   Find the distribution function of X.

      (b)   If a random variable has a Poisson distribution such that $P(1) = P(2)$, find
            (i) mean of the distribution (ii) $P(4)$.

12   (a)   Out of 800 families with 4 children each, how many families would be expected to have (i) 2 boys and 2 girls (ii) at least one boy (iii) no girl (iv) at most two girls? Assume equal probabilities for boys and girls.

      (b)   A sample of 100 dry battery cells tested to find the length of life produced the following results :
$\bar{x} = 12$ hours, $\sigma = 3$ hours.
Assuming the data to be normally distributed, what percentage of battery cells are expected to have life
(i) more than 15 hours (ii) less than 6 hours (iii) between 10 and 14 hours?

B.TECH. DEGREE EXAMINATION, APRIL 2021
II B.Tech I Semester

ENVIRONMENTAL STUDIES
(Common to CE, EEE, ECE, CSE & IT)

Time : 3 hours   Max Marks: 60

Answer SIX Questions, Choosing ONE Question from each section
All Questions carry equal marks
* * *

SECTION - I

1   (a)   Define environment. Write briefly about the importance of environmental studies.

    (b)   State the interrelationship of hydrosphere with the other components of environment.

2   Explain the need for public awareness regarding the environmental issues. How it can be achieved?

SECTION - II

3   Discuss the impact of modern agriculture on the environment.

4   (a)   Discuss the use of alternate energy sources.

    (b)   Write short notes on impact of energy use on environment.

SECTION - III

5   Describe the structure and functions of an eco-system.

6   Define bio diversity. Distinguish between in-situ and ex situ conservation.

SECTION - IV

7   What are the causes, effects and control measures of noise pollution?

8   Write short notes on
          (a) Floods
          (b) Earthquakes

SECTION - V

9   What is rain water harvesting? List the advantages of rain water harvesting. Classify the rain water harvesting methods.

10   Write short notes on
          (a) Acid rain
          (b) Ozone layer depletion

SECTION – VI

11 (a)   What are the problems created by the growing population of the earth?
    (b)   Write about the forest conservation act, 1980.

12   Based on your field visit, summarize your observations and findings of water resource eco system in your region.

B.TECH. DEGREE EXAMINATION, APRIL 2021
II B.Tech. I Semester

SIGNALS & SYSTEMS
(Common to EEE & ECE)

Time: 3 hours   Max. Marks: 60

*Answer **SIX** Questions, Choosing **ONE** Question from each section*
*All Questions carry equal marks*
* * *

SECTION - I

1   (a)   Find whether the signal is Periodic or not. If it is periodic find the fundamental period
          a) $x(n) = \sin\frac{2\pi}{3}n + \cos\frac{2\pi}{5}n$

          b) $x(t) = \cos(2t) + \cos(3\pi t)$

    (b)   Define Mean square error and derive the expression for Mean square error?

2   (a)   Explain the analogy between vectors and signals?

    (b)   Find the following signals are energy or power signal and calculate their energy or power

              i) $x(t) = Ae^{-at}u(t)$, $a > 0$ ii) $x(n) = (1/2)^n u(n)$

SECTION - II

3   (a)   Find the relation between Trigonometric and Exponential Fourier Series Coefficients?

    (b)   Find the Exponential Fourier series of the signal
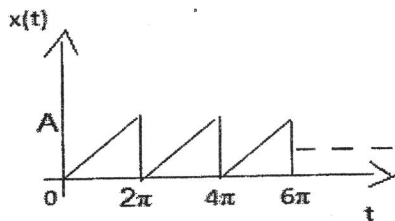
4   (a)   Find the trigonometric Fourier Series of the signal
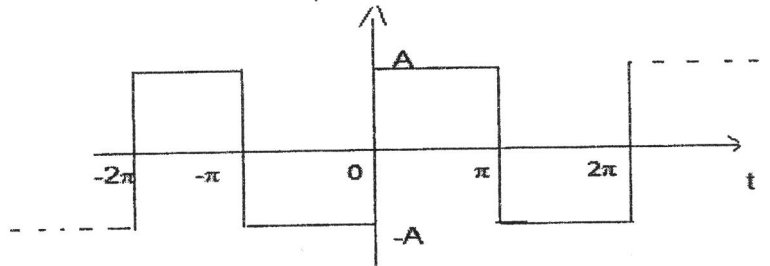
    (b)   Write a short notes on complex Fourier Spectrum?

SECTION - III

5   (a)   Find the Fourier transform of signal signum function sgn(t)?

     (b)   State and prove the time shifting and time convolution properties of Fourier transform?

6   (a)   Find the Fourier transform of the signal rectangular gate function and draw the spectrum?

     (b)   Find the Fourier transform of the periodic impulse train or comb function

SECTION - IV

7   (a)   Explain the Flat top sampling method?

     (b)   Determine the Nyquist interval and Nyquist rate of the following signal $x(t)=1+\cos 2000\pi t+\sin 4000\pi t$

8   (a)   State and prove the sampling theorem

     (b)   Explain the comparison of various Sampling methods?

SECTION - V

9   (a)   Find whether the systems are linear, time invariant, stable and causal
        i) $y(n) = a^{|x(n)|}$ ii) $y(n)=\log_{10}[|x(n)|$

     (b)   Why the Low pass filters are physically unrealizable?

10   (a)   Derive the relationship between rise time and bandwidth?

     (b)   Explain the Causality and Paley-Wiener criterion for Physically Realization?

SECTION - VI

11   (a)   State and prove the time reversal and time convolution in DTFT?

     (b)   Find the DTFT of the signal $x(n)=(0.2)^n u(n)+(0.2)^{-n} u(-n-1)$

12   (a)   Find the convolution between two signals of input $x(n)=\left(\frac{1}{2}\right)^n u(n)$ and impulse response of the system $h(n)=\left(\frac{3}{4}\right)^n u(n)$ using Discrete time Fourier transform

     (b)   Find the DTFT of the signal $x(n)=a^{|n|}$

B.TECH. DEGREE EXAMINATION, APRIL 2021
II B.Tech I Semester

ELECTROMECHANICAL ENERGY CONVERSION - I
(Electrical & Electronics Engineering)

Time: 3 hours   Max. Marks: 60

Answer SIX Questions, Choosing ONE Question from each section
All Questions carry equal marks
* * *

SECTION - I

1   Explain the construction and working DC generator

2   (a) Derive the EMF equation of the DC generator.

    (b) A 4 pole wave wound motor armature has 880 conductors and delivers 120A. the brushes have been displced through 3 angular degrees from the geometrical axis. Calculate (a) demagnetising amp-turns/pole (b) cross magnetising amp-turns/pole (c) the additional field current for neutralizing the demagnetisation of the filed winding has 1100 turns/pole

SECTION - II

3   (a) Draw and explain characteristics of compound wound generator

    (b) The magnetization curve of a dc shunt generator at 1500 rpm is

If (amps)	0	0.4	0.8	1.2	1.6	2.0	2.4	2.8	3.0
Eo (V)	6	60	120	172.5	202.5	221	231	237	240

For this generator find (i) no load e.m.f for a total shunt field resistance of 100 ohms (ii) the critical field resistance at 1500 rpm

4   What is meant by commutation and explain about methods of Improving Commutation.

SECTION - III

5   (a) Derive the expression for Torque developed in DC motor.

    (b) Determine (i) the total torque developed (ii) the useful torque of a 250 V, 4 pole series motor with 782 wave connected conductors developing 8 kW and taking 40 A with a flux per pole of 25 mWb. The armature resistance of the motor is 0.75 ohms.

6   (a) Explain speed-current, torque-current and speed-torque characteristics of DC compound motor.

    (b) DC motor connected to a 460V supply has an armature resistance of 0.25 ohm. Calculate the value of back e.m.f when the armature current is 120A and the value of armature current when the back e.m.f is 447.4V?

SECTION - IV

7   (a)   Give the poser stages in DC motor.

    (b)   A 4 pole, 240V, wave connected shunt motor gives 1118 kw when running at 1000 r.p.m and drawing armature and field currents of 50A and 1 A respectively. It has 540 conductors. Its resistance is 0.1 ohm. Assuming a drop of 1V per brush, find total torque, useful torque, useful flux per pole, rotational losses and efficiency?

8   (a)   Explain the Hopkinson's test for determination of efficiency of shunt machines.

    (b)   In a retardation test on a D.C motor, with its field normally excited, the speed fell from 1525 to 1475 in 25 seconds. With an average load of 1 kW supplied by the armature, the same speed drop occurred in 20 seconds. Find the moment of inertia of the rotating parts in kg.m^2?

SECTION - V

9   (a)   Derive the emf equation of transformer and explain the significance of each term in it.

    (b)   A 100 kVA, 2000/200 V, 50 Hz distribution transformer has core loss of 750 W at rated voltage and copper loss of 1500 W at full load. It has the following load cycle:

% load	0%	50%	75%	100 %	110 %
Power factor	-	0.95 lag	0.8 lag	0.85 lag	0.95 lag
Hours	3	6	8	5	2

Determine the all-day efficiency of the transformer?

10 (a)   Develop the exact equivalent circuit of a 1-phase transformer. From this derive the approximate and simplified equivalent circuits. State the various assumptions made?

    (b)   A 2-winding 10 kVA, 440/110 V transformer is reconnected as a step-down 550/440 V autotransformer. Compare volt-ampere rating of the autotransformer with that of original 2-winding transformer. Calculate power transferred to the load: (i) inductively (ii) conductively.

SECTION - VI

11 (a)   Explain Sumpner's test on single phase transformer and also list its advantages?

    (b)   Following readings were obtained from O.C. and S.C. tests on a 8 kVA, 400/120V, 50 Hz transformer:
          O.C. Test: (l.v. side) : 120 V; 4 A; 75 W
          S.C. Test: (h.v.side) : 9.5 V; 20 A; 110W
          Obtain i) Voltage regulation and efficiency for 0.8 lagging power factor load, and ii) The efficiency at half full – load and 0.8 power factor load.

12 (a)   What is the total load capacity of V-V bank as compared with a delta-delta bank?

    (b)   A balanced 3-phase, 100 kW load at 400V and 0.8 p.f. lag is to be obtained from a balanced 2-phase, 1100V lines. Determine the kVA rating of each unit of the Scott-connected transformer.

B.TECH. DEGREE EXAMINATION, APRIL 2021
II B.Tech. I Semester

POWER SYSTEMS - I
(Electrical & Electronics Engineering)

Time: 3 hours   Max. Marks: 60

*Answer **SIX** Questions, Choosing **ONE** Question from each section*
All Questions carry equal marks
* * *

SECTION - I

1   (a)   Explain the functions of following components in Thermal Power Station.
          (i) Economizer (ii) Cooling Tower

    (b)   Explain the essential factors that influence the choice of site for a Thermal Power
          Station

2   (a)   Explain the various types of Condensers that can be used in a thermal power plant.

    (b)   What are the advantages and disadvantages of Thermal Power Plant

SECTION - II

3   (a)   Explain the various types of turbines that can be used in a hydro-electric power plant.

    (b)   Explain the importance of surge tank and pen stock

4   (a)   Draw a neat schematic diagram of a hydro-electric plant and explain the functions of
          various components.

    (b)   Explain the essential factors that influence the choice of site for hydro-electric plant.

SECTION – III

5   (a)   Explain the working of pressurized water reactor along with its merits and demerits.

    (b)   Explain the operation of fast breeder reactor and state its advantages and
          disadvantages.

6   Draw the schematic diagram of a nuclear power station and discuss its operation
          along with merits and demerits.

SECTION - IV

7   (a)   A consumer has following connected loads: 10 lamps of 60W each, and two heaters
          of 1000W each. Maximum demand is 1500W. On the average he uses 8 lamps 5
          hours a day and each heater for 3 hours a day. Find his average load, monthly energy
          consumption, and load factor.

    (b)   Mention the objectives of Tariff

8   (a)   Write a short note on the following (i) Two-part tariff (ii) Power factor tariff.

    (b)   What are the drawbacks of low power factor? Also mention the causes of low power
          factor.

SECTION - V

9   (a)   Derive an expression for the capacitance of three phase overhead line with symmetrical spacing

      (b)   Derive the expression for the inductance of a single phase two wire line.

10   (a)   Explain the effect of earth on capacitance of the line.

      (b)   Derive an expression for the inductance of three phase overhead line with unsymmetrical spacing

SECTION - VI

11   (a)   Write a short note on radio interference of corona

      (b)   Derive an expression for sag in overhead line when supports are at unequal level

12   (a)   Explain the phenomenon of corona. How can the corona loss can be minimized in transmission lines?

      (b)   Write a short note on Ferranti effect in overhead transmission line.

B.TECH. DEGREE EXAMINATION, APRIL 2021
II B.Tech I Semester

PULSE AND ANALOG CIRCUITS
(Electrinics & Communication Engineering)

Time: 3 hours   Max. Marks: 60

*Answer **SIX** Questions, Choosing **ONE** Question from each section*
All Questions carry equal marks
* * *

SECTION - I

1 (a) A 10Hz square wave is fed to an amplifier. Calculate and plot the output wave form under the following conditions. The lower 3-dB frequency is
(i) 0.3Hz   (ii)30Hz

(b) Derive the expression for tilt in a RC high pass circuit for square wave input.

2 (a) A limited ramp is applied to a RC integrator circuit. What is the peak of the output wave form for
T=0.2RC   (ii) T=5RC

(b) A symmetrical square wave whose peak-to-peak amplitude is 2V and whose average value is zero is applied to a RC integrating circuit.The time constant is equals the half-period of the square wave.Find the peak-to-peak value of the output amplitude.

SECTION - II

3 (a) Explain Transistor switching times in detail.

(b) Explain the response of a clamping circuit to a square wave input under steady state conditions.

4 (a) Discus how diode acts as a Switch.

(b) Explain double diode clipper circuit with example.

SECTION - III

5 (a) Design a collector coupled Astable multivibrator circuit for the following specifications:
F=5KHz,V_{CC} = 10 V, I_C(sat) = 1 mA and h_{fe}(min) = 25.

(b) Explain how Mono stable multivibrator acts as a V- T converter.

6 (a) With neat sketch, explain the operation of a Schmitt trigger circuit.

(b) Explain triggering methods and Collector catching diodes with respect to Multivibrator in detail.

SECTION - IV

7 (a) Explain the basic principles of Miller and Boot-strap time-base generators.

(b) Derive the slope error in Miller sweep circuit.

8 (a) Explain the formation of sweep signal in Boot-strap generator and derive the sweep signal time period.

(b) Derive the slope error in Boot-strap sweep circuit.

SECTION - V

9 (a) Explain the operation of stagger tuned amplifier.

(b) Explain the operation of small-signal tuned amplifiers.

10 (a) Derive the expressions for frequency of oscillation and condition for starting of oscillation in Hartley oscillator.

(b) A Colpitts oscillator is designed with C2=100 pF and C1=7500 pF.The inductance is variable. Determine the range of inductance values, if the frequency of oscillation is to vary between 950 and 2050 KHz.

SECTION - VI

11 (a) Compare the characteristic features of Direct coupled, RC coupled and Transformer coupled amplifiers.

(b) Draw the circuit diagram of Class B Push-Pull amplifier and describe its principle of operation.

12 (a) What are the different methods of classifying amplifiers? How are they classified, based on coupling? Explain.

(b) Explain the operation of Class-A power amplifier with a neat circuit diagram and waveforms

B.TECH. DEGREE EXAMINATION, APRIL 2021
II B.Tech. I Semester
ELECTRONIC CIRCUITS
(Electronics & Communication Engineering)

Time: 3 hours   Max. Marks: 60

Answer SIX Questions, Choosing ONE Question from each section
*All Questions carry equal marks*
* * *

SECTION - I

1 (a) With the help of a neat circuit diagram, input and output waveforms, describe the operation of Half-wave rectifier.

   (b) Derive the expressions for ripple factor and maximum efficiency of HWR.

2 (a) Design a Full-wave center-tap rectifier with capacitor filter and explain its operation.

   (b) Derive the expression for ripple factor of a Full-Wave center-tap rectifier with capacitor filter and then comment on the result.

SECTION - II

3 (a) Discuss the various techniques of Stabilization of a Q Point in a Transistor

   (b) Calculate the Stability factor for a fixed bias circuit

4 (a) Explain the circuit which uses a diode to compensate for changes in V_{BE} and in I_{CO}.

   (b) Discuss the operation in Thermistor compensation.

SECTION - III

5 (a) Draw the h-parameter model for Transistor in CE configuration and determine the h-parameters

   (b) A voltage source of internal resistance $R_s = 900\Omega$ drives a CC amplifier using load resistance $R_L = 2000\Omega$. The CE h parameters are $h_{fe}=60$, $h_{ie}=1.2k$, $h_{oe} = 25\mu A/V$ and $h_{re} = 2 \times 10^{-4}$. Compute A_I, R_i, A_v and R_0 using approximate analysis.

6 (a) Derive input impedance, output impedance and voltage gain of JFET Common Source Amplifier with voltage divider bias for bypassed R_s.

   (b) For the Circuit shown in Fig. determine input impedance, output impedance and voltage gain
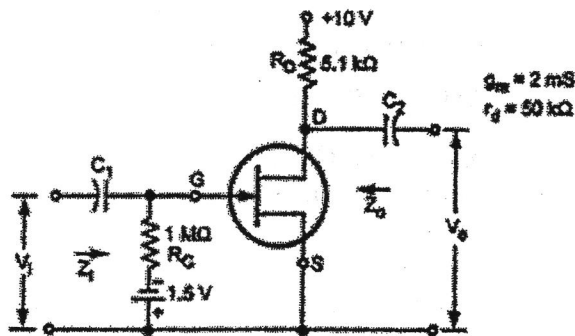
SECTION - IV

7   (a)   What is Darlington Pair? Give the complete analysis of Darlington amplifier.

       (b)   With neat diagram, analyze the two stage RC coupled amplifier

8   (a)   Define Coupling. Describe different types of coupling multistage amplifiers in detail

       (b)   Explain how the input impedance is increased by Bootstrap Emitter Follower with neat diagram

SECTION - V

9   (a)   Derive the expression for CE Short circuit current gain with the help of necessary circuit diagrams and approximations.

       (b)   Explain the significance of Hybrid π capacitances. Derive the expression for C_{de}.

10   (a)   Derive the expression for cut off frequencies f_{α}, f_{β} and f_T

       (b)   Short circuit CE current gain of a transistor is 25 at a frequency of 2MHz. If f_{β} = 200KHz Calculate (i) f_T (ii) h_{fe} (iii) Find $|A_i|$ at frequency of 10MHz and 100MHz.

SECTION - VI

11   (a)   Derive the expressions of input and output resistances for Voltage Series Feedback Amplifier

       (b)   Explain the characteristics of negative feedback amplifiers

12   (a)   Explain Feedback topologies.

       (b)   An amplifier has an open loop gain of 1000 and a feedback ratio of 0.04. If the open loop gain changes by 10% due to temperature, find the percentage change in gain of the amplifier with feedback.

B.TECH. DEGREE EXAMINATION, APRIL 2021
II B.Tech I Semester

FUNDAMENTALS OF DIGITAL CIRCUITS
(Electronics & Communication Engineering)

Time: 3 hours   Max. Marks: 60

Answer SIX Questions, Choosing ONE Question from each section
All Questions carry equal marks
* * *

SECTION - I

1   (a)   Convert the following numbers into equivalent decimal numbers
          (i) $(B65F)_{16}$ (ii) $(110101)_2$ (iii) $(165.15)_8$

    (b)   Perform the subtraction with the following binary numbers using 1's complement
          and   2's complement
                    (i) 11010 – 1101   (ii) 100 - 110000

2   (a)   Represent $(524)_{10}$ in BCD   Excess-3 code.

    (b)   Draw the logic diagram of (A+B)(C+D)(A'+B+D) without simplifying.

SECTION - II

3   (a)   Realize the XOR function using NAND logic and NOR logic.

    (b)   Reduce the following boolean expression to the required number of literals.
          BC + AC' + AB + BCD to four literals

4   (a)   Find F in POS form for F (A,B,C,D = $\prod(1,3,7,11,15) + d(0,2,5)$

    (b)   Simplify the function F (A,B,C,D) = $\sum(0,1,3,4,6,8,15)$ using K-Map.

SECTION - III

5   (a)   Design full adder with three binary inputs and two binary outputs and also implement
          the full adder using only NAND gates.

    (b)   Define Mux and De-Mux.

6   (a)   Prove that NAND and NOR operations are commutative but not Associative.

    (b)   Design a 4 bit BCD adder using Full adder circuits

SECTION - IV

7   (a)   Draw the logic diagram of a SR latch using NAND and NOR gates. Explain its
          operation using excitation table.

    (b)   Convert JK Flip-Flop to SR and T Flip-Flops.

8   (a)   Convert a T flip flop to D type flip flop

     (b)   Draw a neat circuit diagram of positive triggered D flip flop and explain its operation.

SECTION - V

9   (a)   Define counter. Design a 4 bit Asynchronous counter.

     (b)   Design a Mod-12 synchronous counter.

10   (a)   Design an asynchronous modulo-6 counter. Use SR flip flop in the design.

     (b)   Design a BCD counter with JK- flip-flops.

SECTION - VI

11   (a)   Implement the following Boolean functions with a PAL and PLA.
            (i) $F1 = \sum m (3, 6, 7, 10, 13, 15)$
            (ii) $F2 = \sum m (1, 9, 12, 15)$
            (iii) $F3 = \sum m (2, 6, 8, 10, 14, 15)$

     (b)   Differentiate RAM & ROM.

12   (a)   Write a brief note on sequential programmable devices.

     (b)   Explain about Read and Write cycles of a static RAM with neat timing waveforms.

B.TECH. DEGREE EXAMINATION, APRIL 2021
II B.Tech I Semester

ELECTRICAL MACHINES
(Mechanical Engineering)

Time: 3 hours   Max. Marks: 60

*Answer **SIX** Questions, Choosing **ONE** Question from each section*
All Questions carry equal marks
* * *

SECTION - I

1 (a) Explain the construction and principle of operation of DC generator.

   (b) Distinguish between self- excited and separately excited DC generators. How the self- excited generators are classified? Give their circuit diagrams.

2 (a) What is the critical field resistance of a DC shunt generator? Explain

   (b) Derive an expression for the emf generated in a dc machine?

SECTION - II

3 (a) Explain the mechanical and electrical characteristics of dc cumulative and differential dc motors.

   (b) Discuss Armature reaction and commutation in DC motors. Explain their effects on the performance of the motor and give remedies to their effects.

4 (a) Explain why the emf generated in the armature of a DC Motor is called 'back emf'.

   (b) The armature of a 4 pole lap wound dc machine has core length = 45 cm, diameter = 50 cm, total conductors = 500, speed =1200 rpm and current = 25 A. For an average flux density of 0.6 T, find the electromagnetic (or gross mechanical) power developed and the internal torque.

SECTION - III

5 (a) Explain the working of a transformer at no-load condition.

   (b) A 500KVA transformer has an efficiency of 95% at full load and also at 60% of full load; both at VPF.
         i)   Separate out the losses of the Transformer.
         ii)   Determine the efficiency of the Transformer at ¾ full-load.

6 (a) Explain the operation of transformer under load condition.

   (b) A 1000V, 50Hz supply to a transformer results in 650W hysteresis loss and 400W eddy current loss. If both the applied voltage and frequency are doubled, find the core losses.

SECTION - IV

7. (a) Obtain the equivalent circuit of a 3φ induction motor. Draw the phasor diagram based on the equivalent circuit obtained.

   (b) Explain the operation of induction generator and list its applications.

8. (a) Discuss the theory of star-delta starter.

   (b) Explain the construction of three phase induction motor.

SECTION - V

9. (a) Explain the constructional details of PMSM.

   (b) Discuss the principle of operation of PMSM.

10. (a) Explain the Torque-speed characteristics of PMSM.

    (b) Discuss what are the Power controllers used in PMSM.

SECTION - VI

11. (a) Explain the construction details of radial flux BLDC motor.

    (b) What are the advantages of Brushless DC machines over AC motors and explain the principle of operation of Brushless DC motor.

12. (a) What is a BLDC motor? Give the mathematical modeling of a BLDC motor

    (b) Explain the commutation process in BLDC machines.

B.TECH. DEGREE EXAMINATION, APRIL 2021
II B.Tech I Semester

PROFESSIONAL ETHICS AND INTELLECTUAL PROPERTY RIGHTS
(Mechanical Engineering)

Time: 3 hours   Max. Marks: 60

*Answer **SIX** Questions, Choosing **ONE** Question from each section*
All Questions carry equal marks
* * *

SECTION - I

1   (a)   Describe the Objectives of the study on Professional Ethics in Engineering.

     (b)   Write the importance of Yoga & Meditation for professional excellence.

2   (a)   What is Values? Elaborate types of Value.

     (b)   Write short notes on below
           Caring, Self-confidence, Courage, Empathy, Civic virtue

SECTION - II

3   Describe the situations leading to Moral dilemmas & steps to solve Moral dilemma

4   Define Moral autonomy. Describe Kohlberg's theory and Gilligan's theory on moral autonomy.

SECTION - III

5   Describe the importance of each Intellectual property rights.

6   (a)   What obligations are granted to the Patentee when a patent is issued?

     (b)   Describe about the Liability issues related to IPR.

SECTION - IV

7   (a)   Discuss about the "Inventions not Patentable".

     (b)   Describe about information's contained in a Patent application.

8   What is Patent and describe the Patent types with necessary examples?

SECTION - V

9   (a)   What are the classes of works for which Copyright protection is available in India and explain in detail.

     (b)   Discuss about Performer's rights.

10   Explain the different process, procedures and documents associated in Copy right. Draw the figure to explain.

SECTION - VI

11   (a)   What are the functions of Trademarks?

     (b)   How to select and evaluate the Trademark for the company?

12   (a)   What is meant by Trade Secrets ? Describe the types of Trade Secrets.

     (b)   How to perform Trademark registration and explain?

B.TECH. DEGREE EXAMINATION, APRIL 2021
II B.Tech I Semester
BASIC THERMODYNAMICS
(Mechanical Engineering)

Time: 3 hours   Max. Marks: 60

Answer SIX Questions, Choosing ONE Question from each section
All Questions carry equal marks
* * *

SECTION - I

1 (a) Define a thermodynamic system. Differentiate between closed, open and isolated system.

   (b) A mass of 1.5 kg of air is compressed in a quasi-static process from 0.1 MPa to 0.7 MPa for which PV = constant. The initial density of air is 1.16 kg/m^3. Find work done by the piston to compress the air.

2 (a) Explain the concept of thermodynamic work and differentiate it with mechanical work. What is positive and negative work?

   (b) Explain the quasi static process and give examples for it.

SECTION - II

3 (a) State and explain the first law of thermodynamics for a closed system undergoing a cycle change.

   (b) State the First Law of Thermodynamics and prove that for a non-flow process, it leads to the energy equation $Q = \otimes U + W$.

4   The specific heat of a gas at constant pressure is given by the empirical relation:
        $C_p = 1.05 + 2.25 \times 10^{-4} T_1 \, 3.4 \times 10^{-7} T_2$
        Where, C_p is in kJ /kg K and T is in kelvin. Calculate per kg of the gas
        (a) the change in enthalpy,
        (b) the change in internal energy, and
        (c) the average specific heat under constant pressure when the gas is heated from 300 K to 950 K.
        The specific gas constant of the gas is 0.32 kJ /kg K.

SECTION - III

5 (a) Derive Clausius-Clapeyron equation.

   (b) A domestic food freezer maintains a temperature of – 15°C. The ambient air temperature is 30°C. If heat leaks into the freezer at the continuous rate of 1.75 kJ/s what is the least power necessary to pump this heat out continuously.

6 (a) Explain Kelvin planck and Clausius statements of second law of Thermodynamics

   (b) A cold storage is to be maintained at -5^{0}C while surroundings are at 35^{0}C. The heat leakage from surroundings into cold storage is estimated to be 29 kW. The actual COP of refrigerating plant is one-third of an ideal plant working between the same temperatures. Find power required.

SECTION - IV

7   (a)   Explain the concepts of "Available energy" , "Availability" and "Irreversibility"

      (b)   A cylinder contains 0.5 m^3 of gas at 1.05 bar and 314 K. If the gas is compressed isothermally to 1.7 bar, determine a). final volume b). change in entropy.

8   (a)   Derive Maxwell relations and explain their importance in thermodynamics

      (b)   Explain the principle of increase of entropy.

SECTION - V

9   (a)   Derive air standard efficiency for an Otto cycle(with usual notations

      (b)   An engine equipped with a cylinder having a bore of 15 cm and stroke of 45 cm operate on an Otto cycle. If the clearance volume is 2000 cm^3. Compute air standard efficiency.

10   (a)   Compare the efficiency of Otto, Diesel and Dual cycle under the conditions
         i). Equal compression ratio and heat input
         ii). Constant maximum pressure and heat input.

      (b)   A diesel engine has a compression ratio of 14 and cut-off takes place at 6% of the stroke. Find the air standard efficiency.

SECTION - VI

11   (a)   Describe the different operations of Rankine cycle. Derive also the expression for its efficiency.

      (b)   Explain the Comparison between Rankine Cycle and Carnot Cycle.

12   (a)   Explain the various operation of a Carnot cycle. Also represent it on a *T-s* and *p-V* diagrams.

      (b)   A simple Rankine cycle works between pressure of 30 bar and 0.04 bar, the initial condition of steam being dry saturated, calculate the cycle efficiency, work ratio and specific steam consumption.

B.TECH. DEGREE EXAMINATION, APRIL 2021
II B.Tech I Semester

BASIC MANUFACTURING PROCESSES
(Mechanical Engineering)

Time: 3 hours   Max. Marks: 60

Answer SIX Questions, Choosing ONE Question from each section
All Questions carry equal marks
* * *

SECTION - I

1   (a)   Describe the steps involved in manufacture of a casting

    (b)   Discuss the ideal requirements of pattern material and list pattern materials

2   (a)   Explain the properties of moulding sand.

    (b)   Suggest a suitable casting process to produce cylindrical liners of an IC engine and explaint it with a sketch.

SECTION - II

3   (a)   Discuss the function of a riser in producing a sound casting. What is the ideal shape of a riser? Justify the reason.

    (b)   A casting of 50 cm x 40 cm x 10 cm solidifies in 20 minutes. Find the solidification time for 40 cm x 30 cm x 5 cm casting under similar condition.

4   (a)   What do you understand by directional solidification? Explain any two methods to promote directional solidification.

    (b)   Elaborate any five casting defects and remedial measures.

SECTION - III

5   (a)   Explain the types of flames used in oxy-acetylene welding with sketches.

    (b)   Illustrate the principle of oxy-fuel gas cutting. What is the change in the design of gas cutting nozzle compared to welding nozzle?

6   (a)   Distinguish between DCSP and DCRP in arc welding with sketches.

    (b)   Explain the principle of submerged arc welding process.

SECTION - IV

7   (a)   Distinguish between metal inert gas welding and tungsten inert gas welding.

    (b)   With the help of a sketch explain the process of friction welding.

8   (a)   Elaborate the process of electron beam welding. When do you prefer it?

      (b)   Discuss various welding defects and remedial measures.

SECTION - V

9   (a)   What do you understand by cold working of metals? List its advantages and limitations.

      (b)   Distinguish between blanking and piercing operations with sketches.

10   (a)   Which forming process is used to manufacture oil pans of IC engines? Explain its principle.

      (b)   Describe the process of magnetic-pulse forming.

SECTION - VI

11   (a)   Outline the principle of rolling process. List types of rolling mills.

      (b)   Explain the process of impact extrusion with a sketch.

12   (a)   Suggest a suitable forging process to produce the connecting rod of an IC engine. Justify the reason for selection of that process and explain it.

      (b)   Discuss various forging defects.

B.TECH. DEGREE EXAMINATION, APRIL 2021
II B.Tech. I Semester

ENGINEERING ECONOMICS & FINANCIAL ACCOUNTING
(INFORMATION TECHNOLOGY)

Time : 3 hours　　　　　　　　　　　　　　　　　　Max. Marks: 60

Answer SIX Questions, Choosing ONE Question from each section
All Questions carry equal marks
* * *

SECTION - I

1　(a)　Define Managerial Economics. Explain Nature of Managerial Economics.

　　(b)　What is Demand? Explain the Demand Determinants.

2　(a)　List out any five Demand Forecasting Methods.

　　(b)　Discuss the different degree of Price elasticity of Demand.

SECTION - II

3　(a)　State various types of economies of Scale?

　　(b)　Describe the determination of cost.

4　　　Give the assumption and limitations of Break – Even Analysis.

SECTION - III

5　(a)　Distinguish between Monopoly and Monophony.

　　(b)　State the features of Perfect competition.

6　　　Critically examine various Pricing Strategies adopted by firms.

SECTION - IV

7　(a)　Evaluate Sole trader firm of Organization.

　　(b)　What are the features of Company?

8　(a)　Explain the functions of Commercial bank in detailed Manner?

　　(b)　Short note on Reserve Bank of India.

SECTION - V

9　　　Briefly Explain Accounting concepts and conventions.

10　　Journalize the following transitions.

　　　　January 1, 2018 , Ajit started business with cash Rs. 40,000
　　　　January 3, he paid into the bank Rs,2000
　　　　January 5, he purchased goods for Rs,15,000
　　　　January 8, he sold goods for cash Rs.6000
　　　　January 12 he sold goods to Arvind,Rs,4000
　　　　January 13, paid salaries Rs.5000
　　　　January 25, commission received Rs.2000

SECTION - VI

11　(a)　Explain need for the capital.

　　(b)　What do you understand by capital Budgeting Process?

12　　Explain various capital Budgeting techniques.

B.TECH. DEGREE EXAMINATION, APRIL 2021
II B.Tech I Semester

SOFTWARE ENGINEERING
(Computer Science & Engineering)

Time: 3 hours   Max. Marks: 60

Answer SIX Questions, Choosing ONE Question from each section
All Questions carry equal marks
* * *

SECTION - I

1   (a)   Define software? Explain the nature of software.

    (b)   Explain in detail about different prescriptive process models.

2   (a)   Explain in detail about the software process

    (b)   Differentiate personal and team process models

SECTION - II

3   (a)   Explain in detail modeling and construction practices.

    (b)   Explain functional, non-functional, uses and system requirements, Give one example for each type related to library management system.

4   (a)   Explain requirement elicitation process.

    (b)   Discover ambiguities or omissions in the following statement of requirements for part of a ticket-issuing system:
    "An automated ticket-issuing system sells rail tickets. Users select their destination and input a credit card and a personal identification number. The rail ticket is issued and their credit card account charged. When the user presses the start button, a menu display of potential destinations is activated, along with a message to the user to select a destination. Once a destination has been selected, users are requested to input their credit card. Its validity is checked and the user is then requested to input a personal identifier. When the credit transaction has been validated, the ticket is issued."

SECTION - III

5   (a)   List the Interface Design Principles while designing the user interface design.

    (b)   List and define any six design concepts.

6   (a)   Discuss the two different dimensions in which the design model can be viewed.

    (b)   In the design process what are the parameters to ensure the design quality.

SECTION - IV

7   (a)   Explain any four architectural styles.

       (b)   What are decisions tables and how you build them

8   (a)   Describe the DIP in your own words. What might happen if a designer depends too heavy on concretions?

       (b)   Compare data design at architecture and data design at component level.

SECTION - V

9   (a)   Explain about basis path testing

       (b)   List and define four approaches of debugging.

10   (a)   What is functional Testing? Explain various techniques of functional testing.

       (b)   Explain in detail about metrics for software quality.

SECTION - VI

11   (a)   Describe five software application areas in which software safety and hazard analysis would be a major concern

       (b)   When do we conduct FTRs, what are its objectives?

12   (a)   Discuss how do you assess the risk impact.

       (b)   What is software quality control? What are the components of the cost of quality?

B.TECH. DEGREE EXAMINATION, APRIL 2021
II B.Tech I Semester

NUMERICAL METHODS, PROBABILITY AND STATISTICS
(Common to CSE & IT)

Time: 3 hours   Max. Marks: 60

*Answer **SIX** Questions, Choosing **ONE** Question from each section*
All Questions carry equal marks
* * *

SECTION – I

1   (a)   Solve the following system of equations by using Gauss-elimination method
$$3x + y - z - = 3,$$
$$2x - 8y + z = -5,$$
$$x - 2y + 9z = 8,$$

     (b)   Solve the following system of equations by using Triangularization method
$$2x - 3y + 10z = 3,$$
$$-x + 4y + 2z = 20,$$
$$5x + 2y + z = -12.$$

2   Solve the following system of equations by using Jacobi iteration or Gauss-Jacobi's method
$$8x - 3y + 2z = 20,$$
$$4x - 11y - z - 33,$$
$$6x + 3y + 12z = 35$$

SECTION – II

3   (a)   Using the table below find $f'(1.76)$

x	1.72	1.73	1.74	1.75	1.76
f(x)	0.17907	0.17728	0.17552	0.17377	0.17204

     (b)   From the following table, find the values of x, correct to four decimal places, for which y is minimum and find the value of y.

x	0.60	0.65	0.70	0.75
y	0.6221	0.6155	0.6138	0.6170

4   (a)   Evaluate $\int_0^1 \frac{1}{1+x} dx$ taking $h = \frac{1}{6}$ by using Trapezoidal rule.

     (b)   The table below shows the temperature f(t) as a function of time

t	1	2	3	4	5	6	7
f(t)	81	75	80	83	78	70	60

Use Simpson's 1/3 method to estimate $\int_1^7 f(t)dt$.

10 (a) A random variable X has the following probability function:

X	1	2	3	4	5	6
P(X)	K	3K	5K	7K	9K	11K

Determine i) K.   ii) Expectation.   iii) Variance.

(b) For the continuous random variable X whose probability density function is given by

$$f(x) = \begin{cases} cx(2-x), if\ 0 \le x \le 2 \\ 0, otherwise \end{cases}$$ where c is a constant. Find c, mean and variance

of X.

SECTION - VI

11 (a) 20% of items produced from a factory are defective. Find the probability that in a sample of 5 chosen at random
   (i) none is defective
   (ii) one is defective
   (iii) $P(1 < X < 4)$.

(b) Using recurrence formula find the probabilities when x = 0, 1, 2, 3, 4 and 5; if the mean of the Poisson distribution is 3.

12 (a) The life of electronic tubes of a certain type may be assumed to be normal distribution with mean 155 hours and S.D. 19 hours. Determine the probability that the life of tube

   (i) Between 136 hours to 174 hours

   (ii) Less than 117 hours

   (iii) More than 195 hours

(b) A hostel switch board receives an average of 4 emergency calls in a 10 minute interval. What is the probability that

   (i) There are at most two emergency calls.

   (ii) Exactly 3 emergency calls, in a 10 minutes interval.

SECTION – III

5   (a)   Evaluate $y(0.1)$ & $y(0.2)$ using Taylor's series method given that $\frac{dy}{dx} = y^2 + x$.

    (b)   Use Runge-Kutta 4th order formula to evaluate $y(0.1)$ and $y(0.2)$ given that $\frac{dy}{dx} = x^2 - y, y(0) = 1$.

6   Solve the Laplace equation by using Gauss-Seidal method for the square region shown in figure the boundary values being as indicated
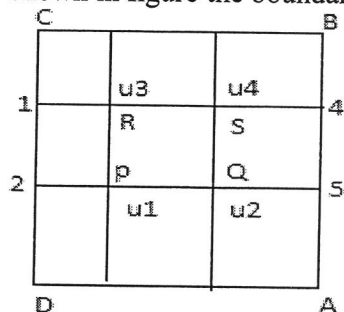
SECTION - IV

7   (a)   Fit a second degree polynomial to the following data by the method of least square:

x	0	1	2	3	4
y	1	1.8	1.3	2.5	6.3

    (b)   Fit the curve $y = ae^{bx}$ for the following data by the method of least square:

x	0	1	2	3	4	5	6	7	8
y	20	30	52	77	135	211	326	550	1052

8   (a)   From the following table, calculate the coefficient of correlation by Karl Pearson method:

X:	6	2	10	4	8
Y:	9	11	?	8	7

Arithmetic mean of X and Y series are 6 and 8 respectively.

    (b)   Calculate coefficient of correlation by Rank method.

X:	75	88	95	70	60	80	81	50
Y:	120	134	150	115	110	140	142	100

SECTION - V

9   (a)   A bag contains 4 green, 6 black and 7 white balls. A ball is drawn at random. What is the probability that it is either a green or a black ball.

    (b)   A bag A contains 2 white and 3 red balls and a bag B contains 4 white and 5 red balls. One ball is drawn at random from one of the bags and it is found to be red. Find the probability that red ball is drawn is from bag B

B.TECH. DEGREE EXAMINATION, APRIL 2021
II B.Tech I Semester
OPERATING SYSTEMS
(Common to CSE & IT)

Time: 3 hours   Max. Marks: 60

*Answer **SIX** Questions, Choosing **ONE** Question from each section*
All Questions carry equal marks
* * *

SECTION - I

1   (a)   Discuss about various computing environments.

    (b)   What is meant by interleaving and overlapping with respect to multi programming and multi processing? Explain. (Assume system have two user processes).

2   (a)   Explain briefly Layered Operating system structure with neat sketch.

    (b)   List and briefly describe types of operating systems.

SECTION - II

3   Consider the following four processes represented as (Process, Arrival Time, Burst Time) with the length of CPU burst in milliseconds. { (P1, 0, 10), (P2, 1, 7), (P3, 2, 13), (P4, 3, 11) }. Using preemptive SJF scheduling: i) Draw Gantt chart. ii) Calculate average waiting time.

4   (a)   What are the criteria for evaluating the CPU scheduling algorithms? Why do we need it?

    (b)   Explain in detail the two popular inter-process communication mechanisms.

SECTION - III

5   What is Dining Philosophers problem? Discuss the solution to Dining philosopher's problem using monitors.

6   (a)   Solve Readers-Writers problem using Semaphores.

    (b)   Explain Banker's deadlock.

SECTION - IV

7   Consider the reference string: 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1 for a memory with three frames. Trace FIFO, optimal, and LRU page replacement algorithms.

8   (a)   Describe the working principle of swapping

    (b)   What is paging? Explain its structure for 32 -byte memory with 4-byte pages

SECTION - V

9   Discuss in detail the file allocation techniques: Sequential, Indexed and Linked

10   List out the various methods for free-space management and explain them

SECTION - VI

11   Differentiate SCAN, C-SCAN and LOOK, C-LOOK disk scheduling algorithms with an example.

12 (a) Discuss about RAID levels.

     (b) Consider a disk queue with following requests for I/O to blocks on cylinders 30,70,115,130.110,80,20,25 (Assume disk head is at 90) Draw FCFS and SSTF scheduling and also determine how many times the disk head changes its direction for each of the above mentioned scheduling techniques.

B.TECH. DEGREE EXAMINATION, APRIL 2021
II B.Tech I Semester
COMPUTER ORGANIZATION
(Common to CSE & IT)

Time: 3 hours   Max. Marks: 60

Answer SIX Questions, Choosing ONE Question from each section
All Questions carry equal marks
* * *

SECTION - I

1   (a)   Describe in detail about the various digital logic gates with graphic symbols and truth tables.

    (b)   Given the two binary numbers $X = 1010100$ and $Y = 1000011$, perform the subtraction (a) $X - Y$ and (b) $Y - X$ by using 2's complements.

2   (a)   Explain in detail about the most common postulates used to formulate various algebraic structures.

    (b)   Given the two binary numbers $X = 1010100$ and $Y = 1000011$, perform the subtraction (a) $X - Y$ and (b) $Y - X$ by using 2's complements.

SECTION - II

3   (a)   Simplify the Boolean function $F(x,y,z) = \sum (3,4,6,7)$.

    (b)   Explain in detail about the logic diagram of a parity generator and checker.

4   (a)   Describe about the implementation of half adder.

    (b)   Write about two-bit by two-bit binary multiplier.

SECTION – III

5   Explain in detail about D flip-flop with asynchronous reset.

6   (a)   Describe about sequential circuit with JK flip-flop.

    (b)   Explain about four bit registers using four D flip flops.

SECTION – IV

7   Explain in detail about Instruction cycle.

8   (a)   Describe about the various addressing modes.

    (b)   Write short notes on RISC.

SECTION - V

9   Explain in detail about addressing sequencing.

10   (a)   Describe about various update/write strategies in cache memory.

      (b)   Write short notes on read only memories.

SECTION - VI

11   Explain in detail about direct memory access.

12   (a)   Describe about Instruction pipeline.

      (b)   Write short notes on arithmetic pipeline.

B.TECH. DEGREE EXAMINATION, APRIL 2021
II B.Tech. I Semester
OBJECT ORIENTED PROGRAMMING THROUGH JAVA
(Common to CSE & IT)

Time : 3 hours

Max. Marks: 60

Answer SIX Questions, Choosing ONE Question from each section
All Questions carry equal marks
* * *

SECTION - I

1 (a) What is meant by code? Briefly explain how Java is platform independent?

  (b) What are the drawbacks of procedural languages? Explain the need of object oriented programming with suitable program.

2 (a) Does Java support multi way selection statement? Justify your answer.

  (b) Differentiate between Static variable and Static methods.

SECTION - II

3 (a) What is Object> Explain how to declare an object with examples?

  (b) Explain the use of 'this' keyword.

4 (a) Discuss various access modifiers available in Java.

  (b) State the difference between method overloading and method overriding.

SECTION - III

5 (a) Describe the different forms of multiple inheritance in Java language.

  (b) What is inheritance and how does it help to create new classes quickly?

6 Describe the process of importing and accessing a package with suitable examples.

SECTION - IV

7 (a) What is an interface? What are the similarities between interfaces and classes?

  (b) How can you extend one interface by the other interface? Discuss.

8 (a) Write a program that includes try block and a catch clause which processes the arithmetic exception generated by division – by zero error.

  (b) What is meant by re –throwing exception? Discuss a suitable scenario for this.

SECTION - V

9 What are the different ways that are possible to create multiple threaded programs in Java?

10 (a) Write a Java program to implement reverse of a string.

  (b) Explain char At ( ) and substring () methods of string class with examples.

SECTION - VI

11 Explain the various event listener interfaces.

12 Write a java program to perform button event action.