Subject Code: R16CE2105

II B.Tech I Semester Supple Examinations, March-2022
FLUID MECHANICS
(CE)

Time: 3 hours   **Max Marks: 60**

Question Paper Consists of **Part-A** and **Part-B**.
Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B
All questions carry equal marks of 12.

PART-A

1. (a) Define the terms cohesion and adhesion.

   (b) What is center of pressure?

   (c) What is rotational and irrotational flow?

   (d) What are the assumptions made in Bernoulli's equation?

   (e) What is a weir? How are weirs classified?

   (f) Mention the major and minor looses in pipe flow

                                                          [2+2+2+2+2+2]

PART-B

                                                          4 X 12 = 48

2. (a) Define the following fluid properties: Density, weight density and specific gravity of a fluid (4M)
   (b) An oil film of thickness 1.5 mm is used for lubrication between a square plate of size 0.9 m × 0.9 m and an inclined plane having an angle of inclination 20^0. The weight of the square plate is 392.4 N and it slides down the plane with a uniform velocity of 0.2 m/s. Find the dynamic viscosity of the oil (8M)

3. (a) What are the modes of measuring pressure? How can you convert the pressure in KPa into the liquid columns and vice versa?
   (b) What is metacentric height? Explain how it is calculated.

4. (a) The flow field is given by $\psi = x^3 y$ Check whether the given field exists or not? Further check whether it is irrotational?
   (b) Given that $u = x^2 - y^2$ and $v = -2xy$, determine the stream function and potential function for the flow

5. (a) Derive Bernoulli`s equation from Euler`s equation of motion.
   (b) A pipe through which water is flowing, is having diameters, 20cm and 10cm at the cross-sections 1 and 2 respectively. The velocity of water at section 1 is given as 4 m/s. Find the velocity head at section 1, 2 and find rate of discharge.

6. (a) Difference between large and small orifice. Obtain an expression for Discharge through a large rectangular Orifice
   (b) Define velocity of approach. How can you account for it while computing the discharge over weirs?

7. (a) What do you mean by pipe in series and pipes in parallel?
   (b) What are hydraulic grade line and total energy line? How do you draw the same?

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R16

II B.TECH. I SEM

SUPPLEMENTARY EXAMINATIONS

MARCH 2022

Subject Code: R16CC2101
II B.Tech I .Semester Supple Examinations, March-2022
BUSINESS MANAGEMENT CONCEPTS FOR ENGINEERS
(ECE &CSE)

Time: 3 hours   Max Marks: 60

Question Paper Consists of **Part-A** and **Part-B**.
Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B
All questions carry equal marks of 12.

PART-A

1. (a) Define Demand and Elasticity of demand   K1
   (b) Write the features of monopoly market   K1
   (c) Explain GAAP principles   K2
   (d) Discuss the statement Espirit de corps   K2
   (e) Define inventory management   K1
   (f) Elaborate PERT and CPM   K2

[2+2+2+2+2+2]

PART-B

4 X 12 = 48

2. (a) Explain Managerial economics with its implications.   K2
   (b) What is forecasting? Explain various methods of demand forecasting. K2

3. (a) Discuss Law of variable proportions   K2
   (b) Explain the concept of kinked demand curve   K2

4. (a) Explain the double entry book keeping system with significance   K2
   (b) Journalize the following transactions. Also state the nature of each account involved in the   K3
       journal entry.
       a. Oct.01, 2020, Ambresh started business with cash Rs. 75,000.
       b. Oct.02. He paid into the bank Rs. 2,500.
       c. Oct.06. He purchased goods for cash Rs. 16,000.
       d. Oct.08. He sold goods for cash Rs. 4,000.
       e. Oct.10. He purchased furniture and paid by cheque Rs. 5,000.
       f. Oct.12. He sold goods to suresh Rs. 4,000.
       g. Oct.13. He purchased goods from suresh Rs. 10,000.
       h. Oct.15. He returned goods to suresh Rs. 5,000.
       i. Oct.17. He received from Arvind Rs. 3960 in full settlement.
       j. Oct.18. He withdraws goods for personal use Rs. 2,000.
       k. Oct.23. He withdraws cash from business for personal use Rs. 2,000.
       l. Oct.27. He Paid miscellaneous charges Rs. 1,500.

5. (a) Define management. Explain the functions of management   K2
   (b) Describe Theory x and Y   K2

6. (a) Discuss various methods of production   K2
   (b) Explain EOQ of inventory management system   K2

7. (a) Differentiate PERT and CPM   K3
   (b) Discuss the significance of Working capital.   K2

Subject Code: R16CE2101

II B.Tech I Semester Supple Examinations, March-2022
PROBABILITY AND STATISTICS
(CE)

Time: 3 hours
Max Marks: 60

Question Paper Consists of **Part-A** and **Part-B**.
Answering the question in Part-A is Compulsory & Four Questions should be answered from Part-B
All questions carry equal marks of 12.

PART-A

1. (a) Find the probability that a leap year taken at random will contain 53 Sundays.

   (b) If X be a normal variate with mean 10 and variance 4 then find $P(X<11)$.

   (c) If the two regression coefficients are 0.8 and 0.2, what would be the value of coefficient of correlation?

   (d) A sample of size 400 collected from the population whose standard deviation is 16. Find the standard error of the mean.

   (e) Define the terms Null Hypothesis and Alternative Hypothesis and give one example each.

   (f) The specification limits on a valve diameter (mm) are LSL = 10.98 and USL = 11.01. Measurements on 80 valves gave $\dot{x}=10.991$ and $s=0.0035$. Find the process capacity indices C_p and C_{pk}.

   [2+2+2+2+2+2]

PART-B

$$4 \times 12 = 48$$

2. (a) In a factory, machine A produces 30% of the output, machine B produces 25%, and machine C produces the remaining 45%. One percent of the output of machine A is defective, as is 1.2% of B's output, and 2% of C's. In a day's run, the three machines produce 10000 items. An item is drawn at random from a day's output is defective. What is the probability that it was produced by A?

   (b) If X is a continuous random variable with probability density function given by

$$f(x)=\begin{cases} \dfrac{1}{4}e^{\frac{-x}{4}}, & \text{for } x>0 \\ 0, & \text{elsewhere} \end{cases}$$

   Find the mean and variance of the X.

3. (a) Find the mean and standard deviation of a normal distribution in which 31% of items are under 45 and 8% are over 64.

   (b) Find the moment generating function of Gamma distribution $f(x)=\dfrac{1}{\Gamma(1/4)}e^{-x}x^{-3/4}, x>0$, at origin and hence find its mean and variance.

• 4. A population consists of five numbers 2, 3, 6, 8 and 11. Consider all possible samples of size 2 that can be drawn with replacement from its population. Find

   (a) The mean and standard deviation of the population.

   (b) The mean of the sampling distribution of means.

   (c) The standard deviation of the sampling distribution of means.

5. A study shows that 16 of 200 tractors produced on one assembly line required extensive adjustments before they could be shipped, while the same was true for 14 of 400 tractors produced on another assembly line. At the 0.01 level of significance, does this support of the claim that the second production line does superior work?

6. (a) Fit a second degree parabola to the following data:

x	10	15	20	25	30	35	40
y	11	13	16	20	27	34	41

(b) The marks secured by recruits in the section test (X) and in the proficiency test (Y) are given below:

Serial number	1	2	3	4	5	6	7	8	9
X	10	15	12	17	13	16	24	14	22
Y	30	42	45	46	33	34	40	35	39

Calculate the rank correlation co-efficient.

7. The following data give the mean and ranges of 15 samples, each consists of 4 compression test results on steel forgings, in thousands of pounds per square inch:

Sample	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
$\bar{x}$	45.4	48.1	46.2	45.7	41.9	49.4	52.6	54.5	45.1	47.6	42.8	41.4	43.7	49.2	51.1
R	2.7	3.1	5.0	1.6	2.2	5.7	6.5	3.6	2.5	1.0	3.9	5.6	2.7	3.1	1.5

(a) Use the data to find the central line and control limits for $\bar{x}$ chart.
(b) Use the data to find the central line and control limits for R chart.
(c) Plot the given data on $\bar{x}$ and R charts based on the control-chart constants in part (a) and (b), and interpret the results.

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Subject Code: R16CE2102

II B.Tech I Semester Supple Examinations, March-2022
BUILDING MATERIALS AND CONSTRUCTION
(CE)

Time: 3 hours   Max Marks: 60

Question Paper Consists of Part-A and Part-B.

Answering the question in Part-A is Compulsory & Four Questions should be answered from Part-B

All questions carry equal marks of 12.

PART-A

1. (a) Write different classification of bricks and their uses in brief?

(b) Distinguish random rubble masonry and coursed rubble masonry

(c) Write short note on Seasoning of timber

(d) What are the ingredients of cement?

(e) What are the different types of floors?

(f) What are the objectives of using paint?

[2+2+2+2+2+2]

PART-B

4 X 12 = 48

2. (a) Define natural bed of a stone and discuss its importance

(b) State the characteristics of Roof tiles: Explain briefly the Mangalore tiles and Alahabad tiles.

3. (a) Compare stone Masonry with brick masonry with neat sketches

(b) Explain in detail about English bond with sketches

4. (a) List out the constituents of limestone. Explain the importance of each

(b) What are the various laboratory tests for cement?

5. (a) Classify various types of lintels and discuss their relative use.

(b) Explain with a neat sketch about king post truss.

6. (a) Explain various causes of dampness in buildings.

(b) What are the various ingredients of paint? Explain the function of each of them.

7. (a) what are the requirements of good foundation.

(b) Explain mat and pile foundations with neat sketch.

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Subject Code: R16CE2104

II B.Tech I Semester Supple Examinations, March-2022

SURVEYING - I

(CE)

Time: 3 hours   Max Marks: 60

Question Paper Consists of **Part-A** and **Part-B**.

Answering the question in Part-A is Compulsory & Four Questions should be answered from Part-B

All questions carry equal marks of 12.

PART-A

1. (a) Give a classification of surveys based on the instruments used.

   (b) What is Reconnaissance? State its importance in Chain Surveying.

   (c) Distinguish between a closed and an open traverse.

   (d) If R.L. of a B.M. is 200.000 m, back sight is 1.525 m and foresight is 3.285 m, R.L. of the forward station, is..............

   (e) Find a suitable contour interval on a map on scale 1 : 50,000.

   (f) List the instruments used in planetabling.

                                                        [2+2+2+2+2+2]

PART-B

                                                        4 X 12 = 48

2. (a) Explain the fundamental principles on which the art of surveying is based.   [05]

   (b) The length of a line measured with a 20-metre chain was found to be 375 metres. The true length of the line was known to be 374.5 metres. Find the error in the chain.   [03]

   (c) Give a complete list of instruments and equipment required for measuring the distance between two points on the surface of the earth.   [04]

3. (a) Give a list of sources of error in chain survey and say which of these are cumulative and which are compensating.   [05]

   (b) A line ABC crosses a river, B and C being on the near and distant banks respectively. Perpendiculars BD and AE 30.5 m and 50.5 m long respectively are drawn such that C, D and E are in a straight line. If the chainage of A and B are 505.5 m and 555.5 m respectively, calculate the chainage of C.   [07]

4. (a) what are the tests for the adjustment of a prismatic compass? How will you adjust a prismatic compass?   [05]

   (b) Following observations were taken with a compass in case of a closed traverse. Calculate the angles and correct the bearings for local attraction, if any. Calculate the true bearings if the declination is 1° 30' west.   [07]

Line	F.F.	B.B.	Declination
AB	51° 30'	230° 00'	
BC	182°40'	356° 00'	1° 30' west
CD	104° 15'	284° 55'	
DE	165° 15'	345° 15'	
EA	251° 30'	79° 00'	

5. (a) Find the error of reading of a levelling staff if the observed reading is 3.555 m and the point sighted at the staff is 10 cm away from the vertical through the bottom. [04]
   (b) Explain (i) reciprocal levelling (ii) fly levelling (iii) differential levelling (iv) simple levelling and state where each is used. [08]

6. (a) What is the difference between direct and indirect methods of contouring? [04]
   (b) From a topographical map, the areas enclosed within the contour lines and along the face of a proposed dam are as given under:

Contour (m)	Area (square metres)
300	29750
295	26850
290	21050
285	18500
280	13440
275	8750
270	5180
265	735
260 (bottom level of reservoir)	30

Compute the volume of water in the reservoir formed, when the water level is at elevation 300 m using: (a) Trapezoidal formula (b) Prismoidal formula [08]

7. (a) Explain the method of adjustment of a planetable traverse graphically. [04]
   (b) What is meant by two-point problem? Explain by sketches how you would it in the field. (No compass is available). [04]
   (c) Give Bessel's graphical method to solve 'three point' problem. [04]

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Subject Code: R16CE2106
II B.Tech I Semester Supple Examinations, March-2022
MECHANICS OF SOLIDS
(CE)

Time: 3 hours   Max Marks: 60

Question Paper Consists of **Part-A** and **Part-B**.
Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B
All questions carry equal marks of 12.

PART-A

1. (a) State Saint Venant's principle.
   (b) Draw the Mohr's circle for a state of pure shear and indicate the principal stresses.
   (c) Explain what do you meant by point of contra flexure?
   (d) Tell about Shear stress and also sketch the shear stress variation for symmetrical I section.
   (e) Differentiate a strut from tie.
   (f) List the types of stresses developed in thin cylinders subjected to internal pressure?

                                                            [2+2+2+2+2+2]

PART-B

                                                            4 X 12 = 48

2. (a) A reinforced concrete column is 300mm x 300mm in section. The column is provided with 8 bars each of 20mm diameter. The column carries a load of 360kN. Calculate the stresses in concrete and the steel bars. Take E_s=210 GN/m^2 and E_c=14 GN/m^2.   [08]
   (b) Assess the relationship between modulus of elasticity and modulus of rigidity.   [04]

3. The stresses at a point in a strained material is P_x= 200 N/mm^2, P_y = -150N/mm^2 and Q= 80 N/mm^2. Solve for the principal plane and principal stress using graphical method and verify with the analytical results.   [12]

4. (a) A simply supported beam of length 10m carries the uniformly distributed load and two point loads as shown in Fig. Label the S.F and B.M diagram for the beam and also calculate the maximum bending moment.   [09]
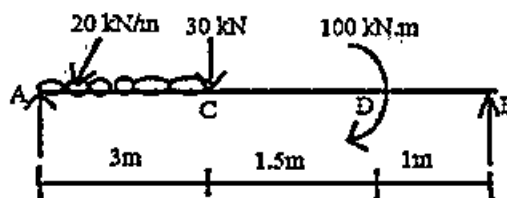
   (b) Discuss about moment of resistance of a beam?   [03]

5. (a) How would you find the bending stress in unsymmetrical sections?   [03]
   (b) A simply supported beam of span 6m is subjected to a UDL of 15kN/m over its entire length. The cross section of beam is 20 cm wide and 30cm deep. Analyze and sketch the variation of bending stress and shear stress in the beam cross section.   [09]

6. (a) A 1.5m long column has a circular cross section of 5cm diameter. One of the ends of the column is fixed in direction and position and the other end is free. Taking factor of safety as 3, calculate safe load using Rankine's formula, take yield stress as 560 N/mm² and α = 1/1600 for pinned ends. [08]

(b) List the limitations of Euler's theory. [04]

7. (a) A solid steel shaft is subjected to a torque of 45kNm. If the angle of twist is 0.5° per metre length of the shaft and the shear stress is not to be allowed to exceed 90MN/m² and C= 80GN/m². Evaluate suitable diameter of the shaft and angle of twist. [06]

(b) A cylindrical vessel, whose ends are closed by means of rigid flange plates, is made up of steel plate 3 mm thick. The length and internal diameter of the vessel are 55 cm and 25.5 cm respectively. Determine the longitudinal and hoop stresses in the cylindrical shell due to an internal fluid pressure of 3.5 N/mm². Also calculate the increase in length, diameter and volume of vessel. Take E = 2×10⁵ N/mm² and μ =0.3. [06]

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Subject Code: R16EE2105

II B.Tech I Semester Supple Examinations, March-2022
COMPLEX VARIABLES AND STATISTICAL METHODS
(EEE)

Time: 3 hours   Max Marks: 60

Question Paper Consists of Part-A and Part-B.
Answering the question in Part-A is Compulsory & Four Questions should be answered from Part-B
All questions carry equal marks of 12.

PART-A

1. (a) Find $\lim\limits_{z \to 1+i}(z^2 - 2z + 1)$

   (b) Evaluate $\int_0^{2+i}(\bar{z})^2 \, dz$ along the line $2y = x$.

   (c) Find the residue of $f(z) = \cot z$ at its poles.

   (d) If X is uniformly distributed over (0, 5], find $P(2 \leq X < 19)$.

   (e) Define the terms population and sample.

   (f) What are type I and type II errors in hypothesis testing?

   [2+2+2+2+2+2]

PART-B

4 X 12 = 48

2. (a) If $u = e^{-x}(x\sin y - y\cos y)$, determine the analytic function $u + iv$.

   (b) Using Milne-Thomson method, find the orthogonal trajectories of the family of curves $x^2 - y^2 = c$, where c is a parameter.

3. (a) Evaluate $\int_{|z+1-i|=2} \dfrac{z+4}{z^2+2z+5} dz$.

   (b) Determine the two Laurent series expansions in power of z of the function $f(z) = \dfrac{1}{z(1+z^2)}$.

4. (a) Show that $\int_0^{2\pi} e^{\cos\theta} \cos(n\theta - \sin\theta) \, d\theta = \dfrac{2\pi}{n!}$.

   (b) Show that (i) $\int_0^{\infty}\dfrac{\sin x}{x}dx = \dfrac{\pi}{2}$ and (ii) $\int_0^{\infty}\dfrac{\cos x}{x}dx = 0$

5. (a) The possibility of a man hitting a target is ¼. (i) If he fires 7 times, what is the probability of hitting the target twice?; (ii) How many times must he fire so that the probability of hitting the target at least once is greater than 2/3?

   (b) If the random variable X has an exponential distribution with mean 2, find $P(X < 1)/P(X < 2)$.

6. (a) If E is such that $P\left(|\bar{x} - \mu| < E\right) > 0.95$, then show that the minimum sample size n is given by $n = \dfrac{(1.96)^2 \sigma^2}{E^2}$, where μ and σ^2 are the mean and variance, respectively, of the population and $\bar{x}$ is the mean of the random variable.

   (b) Show that 95% confidence limits for the mean μ of the population are $\bar{x} \pm \dfrac{\sigma_s}{\sqrt{n}} t_{0.05}$. Deduce that for a random sample of 16 values with mean 41.5 inches and the sum of the squares of the deviations from the mean 135 inches^2 and drawn from a normal population 95% confidence limits for the mean of the population are 39.9 and 43.1 inches.

7. (a) A sample of 100 students is taken from a large population. The mean height of the students in this sample is 160 cm. Can it be reasonably regarded that, in the population, the mean height is 165 cm, and the standard deviation is 10 cm?

   (b) The average marks scored by 32 boys is 72 with a standard deviation of 8, while that for 36 girls is 70 with a standard deviation of 6. Test at 1% level of significance whether the boys perform better than girls.

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Subject Code: R16EE2106

II B.Tech I Semester Supple Examinations, March-2022
ELECTRICAL MACHINES - I
(EEE)

Time: 3 hours   Max Marks: 60

Question Paper Consists of **Part-A** and **Part-B**.
Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B
All questions carry equal marks of 12.

PART-A

1. (a) What is a doubly-excited magnetic system? Mention two examples (CO1, K1)
   (b) Enumerate the various losses in a dc machine (CO2, K2)
   (c) What is the difference between 3-point and 4-point starter? (CO3, K1)
   (d) Distinguish between step-up and step-down transformers. (CO4, K2)
   (e) Explain why OC test is performed on LV side of a single phase transformer? (CO5, K2)
   (f) Mention any two applications of three-winding transformers. (CO6, K2).

[2+2+2+2+2+2]

PART-B

4 X 12 = 48

2. (a) What are the different types of dc generators according to the ways in which field are excited? Show What are the different types of dc generators according to the ways in which field are excited? Show the connection diagram of each type.the connection diagram of each type. (CO1, K1)

   (b) An 8 pole DC generator has per pole flux of 40 mWb and winding is connected in lap with 960 conductors. Calculate the generated EMF on open circuit when it runs at 400 rpm. If the armature is wave wound, at what speed must the machine be driven to generate the same voltage. (CO1, K4)

3. (a) Explain about the open circuit characteristics of a DC generator. Write the necessary equations? (CO2, K2)
   (b) A d.c. shunt generator is supplying load connected to a bus - bar voltage of 220 V. It has an armature resistance of 0.025 Ω and field resistance of 110 Ω. Calculate the value of load current and load power when it generates an e.m.f of 230 V. Neglect the effect of armature reaction. Draw circuit diagram. (CO2, K4)

4. (a) Draw and explain speed-torque and torque-current characteristics of (i) a dc shunt motor and (ii) a dc series motor. (CO3, K3)

   (b) A 4 pole dc series motor has wave connected winding with 600 conductors. Total resistance of the motor is 0.8 Ω. When fed from 250 V source, dc motor supplies a load of 10 kW and takes 50 A with a flux per pole of 3 mWb. For these operating conditions calculate the developed torque and the shaft torque. (CO3, K4).

5. A 25 kVA, 440/110 V, 50 Hz single-phase step-down transformer is designed to work with 1.5 (CO4, K
V per turn with a flux density not exceeding 1.35 T. Determine (i) the required number of turns (CO4, K.
on the primary and secondary windings respectively, (ii) the cross-sectional area of the iron core,
and (iii) the secondary current.

6. (a) Derive expressions for load shared by two transformers operating in parallel when no-load (CO5, K
voltages of these transformers are not equal. What will be the load distribution if the voltage
ratio is exactly equal?

(b) A 400/100 V, 5 kVA, single-phase two winding transformer is to be used as an auto- (CO5, K
transformer to supply 400 V from a 500 V voltage source. When tested as a two winding
transformer at rated load and 0.8 p.f. lagging, its efficiency was found to be 0.95. (i) Determine
its kVA rating as an Auto-transformer. (ii) Find its efficiency as an auto-transformer at rated load
and at 0.8 p.f. lagging.

7. (a) Explain the working of single phase transformer on load? Also draw and explain the phasor (CO6, K
diagram of single phase transformer with capacitive load?

(b) Two scott connected transformers are used for transforming 6600 V three phase to 400 V, 2- (CO6, K
phase. The load on the main transformer secondary is 200 kVA at unity p.f. and the load on the
secondary is 300 kVA at unity p.f. Neglecting the losses , find the currents in the transformer
windings and in the primary supply lines?

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Subject Code: R16ME2101
II B.Tech I Semester Supple Examinations, March-2022
BASIC ELECTRICAL AND ELECTRONICS ENGINEERING
(ME)

Time: 3 hours   Max Marks: 60

Question Paper Consists of **Part-A** and **Part-B.**
Answering the question In Part-A Is Compulsory & Four Questions should be answered from Part-B
All questions carry equal marks of 12.

PART-A

1. (a) State and explain KCL&KVL
   (b) Define regulation of a transformer
   (c) Differentiate between active and passive elements.
   (d) Write applications of DC Shunt Motor.
   (e) Mention the applications of PN junction diode
   (f) Why CE amplifier is widely used.List out its limitations

                                                                    [2+2+2+2+2+2]

PART-B

                                                                    4 X 12 = 48

2. (a)The capacitance values of three capacitors are 20,40, and 60 micro Farads.If these are placed in parallel across a 230V source, find the equivalent capacitance and charge on each capacitor.
   (b) When 3ohm,8ohm and 6ohm resistors are connected in DELTA network.Find the equivalent values in STAR network.

3. (a)Explain the necessity of starters for starting of D.C motor
   (b)Derive an expression for torque developed in a D.C motor

4. (a)Explain the principle and operation of a 1-ph Transformer
   (b) Derive the EMF equation of a 1-phase transformer.

5. a)Explain the Synchronous impedance method to determine the regulation of an alternator.

   b)Explain the operation of Induction motor and write its applications.

6. (a)Compare half wave rectifier and bridge rectifier
   (b)Draw the circuit diagram of NPN junction transistor in CE configuration and describe its characteristics.
7. (a)Derive the frequency response of a Practical integrator.
   (b)Explain the procedure how Op-Amp acts as differentiatior

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Subject Code: R16ME2102

II B.Tech I Semester Supple Examinations, March-2022
MECHANICS OF SOLIDS
(ME)

Time: 3 hours   Max Marks: 60

Question Paper Consists of Part-A and Part-B.
Answering the question in Part-A is Compulsory & Four Questions should be answered from Part-B
All questions carry equal marks of 12.

PART-A

1.
   (a) What are Principle Stresses
   (b) Define the term Point of Contra Flexure
   (c) Write the assumptions made in theory of bending
   (d) What is the relation between load, S.F and B.M
   (e) What are lame's equations
   (f) Explain Buckling

                                                              [2+2+2+2+2+2]

PART-B

                                                              4 X 12 = 48

2. If P1 = 45kN , P3=450kN , P4 = 130kN , Calculate the force P2 necessary for the system in Equilibrium. Determine the total deflections by assuming E = 2.1 X 10^5 N/mm²,
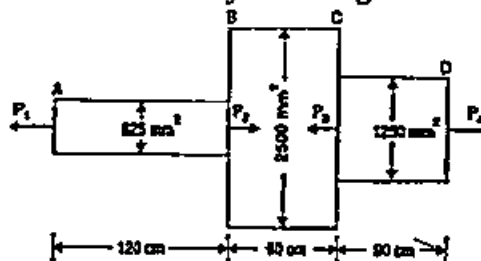
3. Draw S.F and B.M for the simply supported beam of length 7m having uniformly distributed load of 10 KN/m is for 3m from left side while another uniformly distributed load of 5 KN/m is for 2m from other side!

4. Derive the Average and maximum shear stress of Circular cross section. Assume any data if necessary

5. Briefly explain Moment Area Method and Macaulay's method with one example.

6. Derive the Expressions for Circumferential strain, longitudinal strain and volumetric strain when a thin cylinder is subjected to internal pressure P.

7. A solid circular shaft and a hollow circular shaft whose inside diameter is ¾ of outside diameter. Both are of same material , same length and designed to transmit the given torque. Compare the weights of two shafts , if the maximum shear stress developed in the two shafts are equal.

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Subject Code: R16ME2103

II B.Tech I Semester Supple Examinations, March-2022
MATERIAL SCIENCE AND METALLURGY
(ME)

Time: 3 hours   Max Marks: 60

Question Paper Consists of **Part-A** and **Part-B**.
Answering the question in Part-A is Compulsory & Four Questions should be answered from Part-B
All questions carry equal marks of 12.

PART-A

1. (a) Describe the properties of metallic bonds.
   (b) Discuss the Gibb's Phase rule.
   (c) Classify plain carbon steels based on the amount of carbon present in them.
   (d) What do you mean by heat treatment?
   (e) List out the properties of Titaniuim.
   (f) List out the steps involved in powder metallurgy process.

                                                        [2+2+2+2+2+2]

PART-B

                                                        4 X 12 = 48

2. (a) What are different types of solid solutions? Explain them with the help of neat diagrams.
   (b) Explain Hume Rother's rule with suitable examples.

3. (a) Construct the $Fe-Fe_3c$ diagram and label the phases in it.
   (b) Explain the three important reactions that occur in $Fe-Fe_3C$ diagram.

4. (a) What are different types of stainless steels? Explain the properties and applications of any two types of stain less steels.
   (b) Explain the microstructure, composition, properties and applications of white cast iron and grey cast iron.

5. (a) With the help of TTT diagram, explain conventional hardening and interrupted quench hardening processes.
   (b) Explain any one type of carburizing processes with neat sketch. Also mention its advantages and disadvantages.

6. (a) Explain the composition, properties and applications of important brasses.
   (b) Explain the properties and application of few popular aluminium alloys.

7. (a) Explain few important abrasive materials and their applications.
   (b) Discuss in detail about particle reinforced composite materials.

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Subject Code: R16ME2104

II B.Tech I Semester Supple Examinations, March-2022
FLUID MECHANICS
(ME)

Time: 3 hours

Max Marks: 60

Question Paper Consists of **Part-A** and **Part-B**.
Answering the question in Part-A is Compulsory & Four Questions should be answered from Part-B
All questions carry equal marks of 12.

PART-A

1. (a) Write down the expression for capillary fall.
   (b) What is the difference between streak, stream, and path lines?
   (c) State the basic principles behind theory of venturimeter and orifice meter.
   (d) What are the fundamental dimensions?
   (e) What is Hagen Poisuille's formula?
   (f) Write down the Von Karman momentum integral equation.

   [2+2+2+2+2+2]

PART-B

   4 X 12 = 48

2. (a) If the velocity distribution over a plate is given by $u = \frac{2}{3} y - y^2$ in which U is the velocity in

   m/s at a distance y meter above the plate, determine the shear stress at $y = 0$ and $y = 0.15$ m. Take dynamic viscosity of fluid as 8.63 poise.
   (b) The right limb of a simple U-tube manometer containing mercury is open to the atmosphere while the left limb is connected to a pipe in which a fluid of sp.gr 0.9 is flowing. The centre of the pipe is 12 cm below the level of mercury in the right limb. Find the pressure of fluid in the pipe if the difference of mercury level in the two limbs is 20 cm.

3. (a) Derive the equation for stream function in a fluid flow.
   (b) Define the following and give one practical example for each:
      (i) Laminar flow   (ii) Turbulent flow
      (iii) Steady flow   (iv) Uniform flow

4. (a) What is the difference between momentum equation and impulse momentum equation.
   (b) A horizontal venturimeter with inlet and throat diameters 30 cm and 15 cm respectively is used to measure the flow of water. The reading of differential manometer connected to the inlet and the throat is 20 cm of mercury. Determine the rate of flow. Take Cd = 0.98.

5. (a) Explain Buckingham's theorem.
   (b) The resisting force (R) of a supersonic flight can be considered as dependent upon length of aircraft (l), velocity (V), air viscosity 'μ', air density 'ρ', and bulk modulus of air ' k'. Express the functional relationship between these variables and the resisting force.

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

(b) Find 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 of 3 m/s using (i) Darcy formula, (ii) Chezy's formula for which C = 60.

7. (a) Draw a diagram for drag force on a plate due to boundary layer.

(b) Find the displacement thickness, the momentum thickness and energy thickness for the velocity distribution in the boundary layer given by u/U =y/δ, where u is the velocity at a distance y from the plate and u = U at y = δ, where δ = boundary layer thickness.

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Subject Code: R16ME2105

II B.Tech I Semester Supple Examinations, March-2022
THERMODYNAMICS
(ME)

Time: 3 hours   Max Marks: 60

Question Paper Consists of Part-A and Part-B.
Answering the question in Part-A is Compulsory & Four Questions should be answered from Part-B
All questions carry equal marks of 12.

PART-A

1. (a) State Zeroth law of Thermodynamics and give it's significance?
   (b) Distinguish between control volume & control mass analysis
   (c) Write the corollaries of Carnot theorem
   (d) What is a pure substance and what do you understand by saturation states
   (e) Define ideal gas and write about characteristic gas constant.
   (f) Draw PV diagram of Diesel cycle and clearly represent all the processes

[2+2+2+2+2+2]

PART-B

4 X 12 = 48

2. (a) Explain quasi-static process? What is its Characteristic feature?   (4 M)
   (b) A gas in a piston cylinder assembly undergoes an expansion process for which the relationship between pressure and volume is given by PV^n=constant. The initial pressure is 0.3MPa, the initial volume is 0.1m^3, final volume is 0.2m^3. Determine the work for the process in kJ, if a) n=1.5, b) n=0, c) n=1.   (8 M)

3. (a) Write the steady flow energy equation for a multiple inlet and multiple outlet in a control volume and explain the various terms in it.   (6M)
   (b) A gas within a piston–cylinder assembly undergoes a thermodynamic cycle consisting of three processes: **Process 1–2**: Constant volume, $V = 0.028$ m^3, $U_2 - U_1$ =26.4 kJ. **Process 2–3**: Expansion with pV = constant, $U_3 = U_2$. **Process 3–1**: Constant pressure, p = 1.4 bar, W_{3-1} = -10.5 kJ. There are no significant changes in kinetic or potential energy. (i) Sketch the cycle on a p–V diagram. (ii) Calculate the net work for the cycle, in kJ. (iii) Calculate the heat transfer for process 2–3, in kJ.   (6M)

4. (a) An inventor claims to have developed an engine that takes in 1200 kJ at a temperature of 800 K, rejects 800 kJ at a temperature of 600 K, and delivers 1200 kJ of mechanical work. Is this claim correct? Give the proper explanation?   (6M)
   (b) Two kg of water at 900°C are mixed adiabatically with 3.5 kg of water at 200°C in a constant pressure of 1 atmosphere. Find the increase in the entropy of the total mass of water due to the mixing process (Cp of water = 4.187 kJ/kg K).   (6M)

5. (a) Draw the phase equilibrium diagram for a pure substance on P-V, T-S and h-s plots with relevant constant property lines (8M)

(b) 10 kg of water at 450°C is heated at a constant pressure of 10 bar until it becomes superheated vapour at 3000°C. Find the change in volume, enthalpy, internal energy and entropy. (4M)

6. (a) What is Avagadro's law and write equation of state of an ideal gas (4M)

(b) Show that for an ideal gas the internal energy depends only on its temperature (8M)

7. (a) Sketch the Otto cycle on P-V & T-S diagram by clearly explaining all the processes (6M)

(b) An air-standard dual cycle has a compression ratio of 9. At the beginning of compression, p_1 = 100 kPa, T_1 = 300 K, and V_1 = 14 L. The heat addition is 22.7 kJ, with one half added at constant volume and one half added at constant pressure. Determine (i) the temperatures at the end of each heat addition process, in K. (ii) the net work of the cycle per unit mass of air, in kJ/kg. (iii) Thermal efficiency. (6M)

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Subject Code: R16EC2102

II B.Tech I Semester Supple Examinations, March-2022
ELECTRONIC DEVICES AND CIRCUITS
(ECE)

Time: 3 hours
Max Marks: 60

Question Paper Consists of Part-A and Part-B.
Answering the question in Part-A is Compulsory & Four Questions should be answered from Part-B
All questions carry equal marks of 12.

PART-A

1. (a) Define continuity equation.
   (b) Explain the difference between transition and diffusion capacitance.
   (c) Define ripple factor and peak inverse voltage.
   (d) What is early effect?
   (e) What is meant by thermal runaway?
   (f) Why N-channel MOSFET is better than P-channel MOSFET?

[2+2+2+2+2+2]

PART-B

4 X 12 = 48

2. (a) What is Hall-effect? Derive the expression for Hall-coefficient.   6+6]
   (b) Find the concentration of holes and electrons in a P-type germanium at 300^0 K , if the Conductivity is 100 ohm-cm, mobility of hole in germanium u_p=1800 cm^2/Vsec.

3. (a) Draw the energy band diagram of PN- junction under open circuit condition and derive the expression for the contact potential.   [6+6]
   (b) What are the current components present in PN- junction diode and explain?

4. (a) Derive the expression for ripple factor and RMS value of voltage of full wave rectifier with resistive load.   [6+6]
   (b) Explain the operation of LCD with neat diagram?

5. (a) Compare CB,CE,CC configurations. Why CE configuration superior than others?   [6+6]
   (b) Explain construction and working principal of Photo transistor

6. (a) What is meant by transistor biasing? Why it is needed? Explain.   [4+8]
   (b) Explain different bias compensation techniques.

7 (a) Explain the construction and working of Enhancement MOSFET.   [6+6]
   (b) Explain the construction and working of UJT?

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Subject Code: R16EC2103

II B.Tech I Semester Supple Examinations, March-2022
SIGNALS AND SYSTEMS
(ECE)

Time: 3 hours   Max Marks: 60

Question Paper Consists of **Part-A** and **Part-B**.
Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B
All questions carry equal marks of 12.

PART-A

1. (a) Sketch the function $f(t)=2u(t+2)-u(t+1)$
   (b) State Dirichlet's conditions.
   (c) State any two properties of Fourier Transform.
   (d) What is the ROC for the basic function $e^{-\alpha t}u(-t)$
   (e) Find the condition for T, to correctly sample $x(t)=4\sin(2\pi t)+\cos(5\pi t+0.1)+\cos\pi t$

   (f) State Parseval's theorem?

                                                                          [2+2+2+2+2+2]

PART-B

                                                                          4 X 12 = 48

2. (a) Distinguish between
      i.   Periodic and aperiodic signals ii) Energy and power signals
      iii.   Deterministic and random signals
   (b) Find whether the following system is Linear, Time Invariant, Causal and Stable or not?
$y(t)=\int x(t)dt$

3. (a) Explain different types of Fourier series representation and give the relationship among them.
   (b) Determine the exponential Fourier series for the full wave rectified sine wave.

4. (a) Find the Fourier transform of the following signals
   1. $x(t)=e^{2t}u(-t)$ ii. $x(t)=e^{-2t}u(t-1)$
   (b) State and prove any three properties of Fourier transform

5. (a) Find the Laplace transform of $x(t)=t^2e^{-2t}$u(t) and $g(t)=e^{-2t}\sin 2t\, u(t)$
   (b) Explain the filter characteristics of Linear systems.

6. (a) Discuss about the sampling theorem for band limited signals.
   (b) Distinguish between impulse sampling, natural sampling and flat top sampling.

7. (a) Consider $x(t)=e^{-at}u(t)$, $h(t)=e^{-bt}u(t)$, find $y(t)=x(t) * h(t)$ by evaluating the convolution integral.
   (b) State and prove any two properties of autocorrelation function.

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Subject Code: R16EC2104

II B.Tech I Semester Supple Examinations, March-2022
CONTROL SYSTEMS
(ECE)

Time: 3 hours   Max Marks: 60

Question Paper Consists of Part-A and Part-B.
Answering the question in Part-A is Compulsory & Four Questions should be answered from Part-B
All questions carry equal marks of 12.

PART-A

1. a) Why closed loop system is better than an open loop system?
   (b) What is block diagram algebra and show shifting summing point after the block?
   (c) Define settling time and indicate the best suitable settling time for general system.
   (d) Which if these is best to analyse zero order systems? And why? (Qualitative stability and conditional stability)
   (e) Where can be the suitable special use of Bode plots?
   (f) List the controllers used for oscillations free system.

                                                              [2+2+2+2+2+2]

PART-B

                                                              4 X 12 = 48

2. (a) List and explain feedback effects parameters.   6M
   (b) Find the transfer function of the given system.   6M

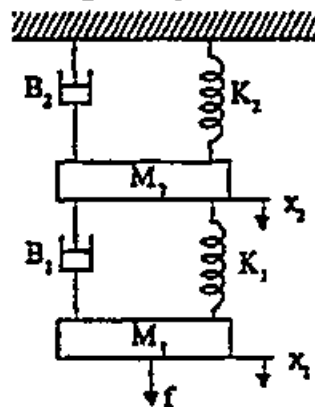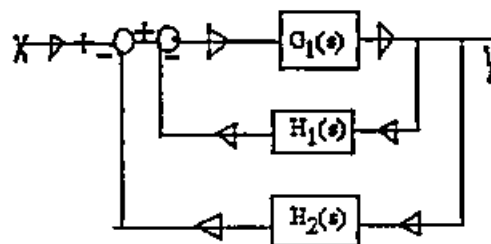Figure 2b.

3. Using again the block diagram algebra, reduce the following two negative feedback control systems to a single block.   12 M

4. The unity feedback system is characterized by an open loop transfer function $G(s) = k / (s(s+4))$. Determine the gain k, so that the system will have a damping ratio of 0.4.for this value of k, determine settling time, peak overshoot and time to peak overshoot for unit step input.   12M

5. (a) List necessary condition for stability to a system and difficulties in Routh table formation.
5M

(b). Using the RH criterion, find out how many closed loop poles of the system shown in below figure lie in the left half plane, in the right half plane and on the jw – axis.   7M
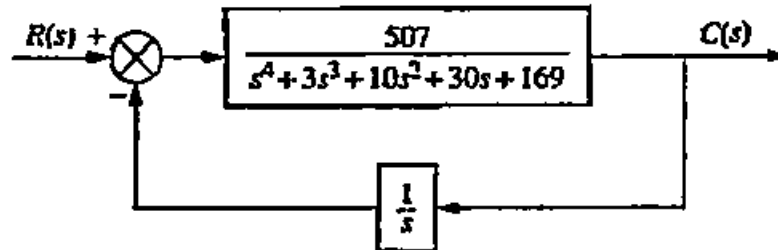

Figure 5b.

6. (a) Unity feedback control system has $G(s)= 6 / (S(S+2)(S+4))$. Draw the Nyquist plot and comment on closed loop stability.   6M

(b) The open loop transfer function of a unity feedback system by $G(S) = 1 / (S^2 (1+S) (1+2S))$ sketch the polar plot and determine the phase margin.   6M

7. (a) Explain, Why derivative controller is not used in control systems?   6M

(b) Find the values for parameters b1, b2 and b3 such that the given system is controllable.   6M

$$A = \begin{bmatrix} 1 & 0 & -1 \\ 0 & 2 & 0 \\ -2 & 0 & 3 \end{bmatrix}, \quad B = \begin{bmatrix} b_1 & 0 \\ 0 & b_2 \\ b_3 & 0 \end{bmatrix}$$

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Subject Code: R16EC2105
II B.Tech I Semester Supple Examinations, March-2022
DATA STRUCTURES
(ECE)

Time: 3 hours   Max Marks: 60

Question Paper Consists of **Part-A** and **Part-B**.
Answering the question in Part-A is Compulsory & Four Questions should be answered from Part-B
All questions carry equal marks of 12.

PART-A

1. (a) Compare Linear and Non Linear datastructures.
   (b) What is the Best case and Worst case Time complexity to search an element in an array using Linear search.
   (c) Convert the give infix expression to postfix expression A+(B*(C-D)/E).
   (d) Compare Linked lists Vs Arrays.
   (e) Construct a Binary tree whose preorder and inorder traversals are
      PREORDER – G->I->B->C->P->Q->A->L
      INORDER – B->I->P->C->Q->G->L->A
   (f) What is Indegree and outdegree of a Vertex.

                                                        [2+2+2+2+2+2]

PART-B

                                                        4 X 12 = 48

2. (a) What is Recursion? How Does Recursion work? Write program to print n terms in a Febinocci sequence using Recursion.   (6M)
   (b) What is ADT? Explain various operations on Array ADT.   (6M)

3. (a) What is the prerequisite for Binary search? Write an algorithm to search an elemet in an array using Binary search.   (6M)
   (b) i. Compare Internal and External sorting.   (2M)
      ii. Sort the elements using Mergesort   76   48   73   12   84   66   93 .   (4M)

4. (a) What is Queue. Write algorithms for various operations of Queue using Linked list representation.   (6M)
   (b) What is stack overflow. Explain Stack overflow situation using a case study, Also write what is the prerequisite for PUSH operation.   (6M)

5. (a) Write an algorithm to
            i. Insert a node in specified position in a single linked list.
            ii. Deleting a node at the end in a single linked list.   (8M)
   (b) Write an algorithm for Traversing both farward and reverse in a double linked list. (4M)

6. (a) Explain with an example how to delete a Node with no children, Node with single child and Node with two childs. (6M)
   (b) What is BST? Explain with an example how search operation requires less time in BST than binary tree with an example. (6M)

7. (a) Define Graph. Explain How to represent a directed graph in computers memory. (5M)
   (b) Write the algorithm for BFS and explain with an example. (7M)

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NEC

Subject Code: R16EC2106

II B.Tech I Semester Supplementary Examinations, (March, 2022)
ELECTRICAL AND MECHANICAL TECHNOLOGY
(ECE)

Time: 3 hours   Max Marks: 60

Question Paper Consists of **Part-A** and **Part-B**.
Answering the question in Part-A is Compulsory & Four Questions should be answered from Part-B
All questions carry equal marks of 12.

PART-A

1. (a) What is the operating principle of a transformer?
(b) What are the advantages of three phase induction motor?
(c) Define the term Damping torque?
(d) What is Arc welding?
(e) Define the term Radiation intensity?
(f) What is a worm and worm wheel?

[2+2+2+2+2+2]

PART-B

4 X 12 = 48

2. (a) Derive an expression for the torque developed in a DC machine?   [6M]
(b) From first principles, derive the equation of a transformer?   [6M]

3. (a) Explain the principle of working of a three phase induction motor?   [6M]
(b) Draw the torque-slip characteristics of a three phase slip ring induction motor?   [6M]

4. Draw the block diagram of general purpose of CRO. Explain the functions of various blocks?
[12M]
5. Explain the following a) Gas welding b) Resistance Welding C) Soldering   [12M]

6. (a) Explain the Natural and Forced Convection?   [6M]
(b) Explain the Thermal Radiation and Black body radiation?   [6M]

7. (a) Explain the different types of belts used for the transmission of power?   [6M]
(b) What are the classifications of gears and explain?   [6M]

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Subject Code: R16CS2102

II B.Tech I Semester Supple Examinations, March-2022
MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE
(CSE)

Time: 3 hours   **Max Marks: 60**

Question Paper Consists of **Part-A** and **Part-B**.

Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B

All questions carry equal marks of 12.

PART-A

1. (a) What is well formed formula in discrete mathematics
   (b) Why do we use mathematical induction?
   (c) How does recursive function work?
   (d) What is distance and diameter of a graph?
   (e) List the applications of pigeonhole principle
   (f) Find the generating function for a sequence 2,2,2,2,2,2

                                                             [2+2+2+2+2+2]

PART-B

                                                   4 X 12 = 48

2. (a) Show that the proposition: $(P \vee \sim Q) \wedge (\sim P \vee \sim Q) \vee Q$ is a tautology
   (b) Obtain principal conjunctive normal form of $(P \wedge Q) \vee (P \wedge \sim P)$

3. (a) Without using truth table show that $p \to (q \to p) \Longleftrightarrow \neg p \to (p \to q)$
   (b) Find and prove a formula for the sum of the first n cubes $1^3 + 2^3 + \ldots \ldots n^3$ Using mathematical induction

4. (a) If A={1,2,3,4} and R,S are relations on A defined by R={(1,2),(1,3),(2,4),(4,4)} S={(1,1),(1,2),(1,3),(1,4),(2,3),(2,4)} find R o S, S o R, R2, S2, write down there matrices.
   (b) Show that for any two sets A and B, A − (A B) = A − B

5. (a) What is connectedness in a directed graphs? And also explain connected and weakly connected, unilateral connected and strongly connected graph. Show some example graphs.
   (b) How to determine adjacency matrix for a graph. Explain properties of adjacency matrix by taking suitable graph with minimum 4 nodes 6 edges

6. (a) If n pigeonholes are occupied by $(kn + 1)$ pigeons, where k is a positive integer, prove that at least one pigeonhole is occupied by $(k + 1)$ or more pigeons. Hence, find the minimum number of m integers to be selected from S = {1, 2,3 ... 9} so that the sum of two of m integers is even.

   (b) Using principle of disjunctive normal form show that the following formulas are equivalent $P \vee (\neg P \wedge Q) \vee (P \vee Q)$

7. (a) Solve the recurrence relation of the sequence of numbers fn=fn-1+fn-2 ,n>=2 With the initial condition f0=1,f1=1.
   (b) What is a Generating function and explain the operations on generating functions?

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Subject Code: R16CS2103

II B.Tech I Semester Supple Examinations, March-2022
JAVA PROGRAMMING
(CSE)

Time: 3 hours   Max Marks: 60

Question Paper Consists of **Part-A** and **Part-B**.
Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B
All questions carry equal marks of 12.

PART-A

1. State and explain briefly about
(a) Polymorphism
(b) Garbage collector
(c) super keyword
(d) isAlive() method
(e) Applet
(f) Layouts

[2+2+2+2+2+2]

PART-B

4 X 12 = 48

2. (a) Illustrate about Java Virtual Machine
(b) Describe Principles ofObject-Oriented Languages
3. (a) Explain Type Conversion and Casting.
(b) Write a program to find the sum and product of all elements of an array.
4. (a) Create a class named 'Member' having the following members:
   Data members
   1 - Name
   2 - Age
   3 - Phone number
   4 - Address
   5 - Salary
   It also has a method named 'printSalary' which prints the salary of the members.
   Two classes 'Employee' and 'Manager' inherits the 'Member' class. The 'Employee' and 'Manager'
   classes have data members 'specialization' and 'department' respectively. Now, assign name, age,
   phone number, address and salary to an employee and a manager by making an object of both of
   these classes and print the same.
(b) Analyze Exception handling techniques
5. (a) Interpret Synchronization concepts.
(b) Demonstrate java.io package.
6. (a) What are the Applets Life Cycle methods? Explain them with example program?
(b) Express your view Adapter classes, Inner classes.
7. (a) Sketch and Explain Java AWT Hierarchy
(b) Discuss about Components in swings with sample program.

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NEC

Subject Code: R16CS2104

II B.Tech I Semester Supple Examinations, March-2022
DATA STRUCTURES
(CSE)

Time: 3 hours   Max Marks: 60

Question Paper Consists of Part-A and Part-B.
Answering the question in Part-A is Compulsory & Four Questions should be answered from Part-B
All questions carry equal marks of 12.

PART-A

1. (a) What is abstract data type? What are all not concerned in an ADT?
   (b) Write worst case and best case complexity of linear search.
   (c) Illustrate the result of each operation in the sequence PUSH(S,4), PUSH(S,1), PUSH(S,3), POP(S), PUSH(S,8) and POP(S) on an initially empty stack S stored in array S[1..6]
   (d) Compare a Singly linked list and Doubly Linked List.
   (e) What is degree of a node in a tree?
   (f) When a graph said to be weakly connected?

[2+2+2+2+2+2]

PART-B

4 X 12 = 48

2. (a) How to find complexity of an algorithm? What is the relation between time and space complexity of an algorithm?
   (b) Explain recursive algorithm of Towers of Hanoi?

3. (a) Using the Heap sort algorithm sort the input file [35 15 40 1 60].
   (b) Given input keys {1, 3, 23, 9, 4, 29, 19} and a hash function h(X) = X mod table size. The initial hash table contains 10 slots, with starting index 0. Show the resulting table after rehashing when the load factor= 0.5, using linear probing

4. (a) Write an algorithm for evaluating a postfix expression and evaluate the following postfix expression using the algorithm AB+CD/AD-EA^ + * where A=2, B=7, C=9, D=3, E=5
   (b) What are queues? How are queues implemented in memory? What are the various queue operations?

5. (a) Define the following terms, with examples: Header linked list ii) Circular linked list
   (b) What are the applications of linked list in dynamic storage management? Explain the deletion operation from a linked list.

6. (a) What is a Binary Search Tree (BST)? Show the structure of the binary search tree after adding each of the following values in that order: 10, 25, 2, 4, 7, 13,11, 22. What is the height of the created binary search tree?

(b) Explain the AVL tree insertion and deletion with suitable example

7. (a) Write algorithm to perform Breadth First Search. Write one possible order of visiting the nodes of the following graph starting at vertex A.
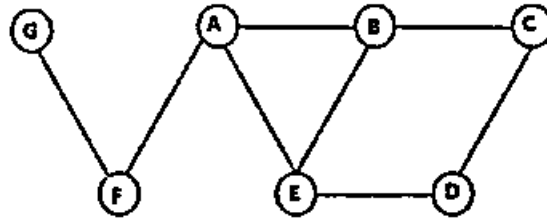
(b) What are the different ways of representing a graph. Explain DFS algorithm using suitable example.

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Subject Code: R16CS2105

II B.Tech I Semester Supple Examinations, March-2022
COMPUTER ORGANIZATION
(CSE)

Time: 3 hours   Max Marks: 60

Question Paper Consists of Part-A and Part-B.
Answering the question in Part-A is Compulsory & Four Questions should be answered from Part-B
All questions carry equal marks of 12.

PART-A

1. (a) Define Register Transfer Language.
   (b) What is Effective Address?
   (c) Write the common fields of Instruction format
   (d) Define locality of reference
   (e) Name the 3 registers in DMA controller
   (f) Define divide overflow

                                                                 [2+2+2+2+2+2]

PART-B

                                                                 4 X 12 = 48

2. (a) Explain different functional units of digital computer with neat sketch
   (b) Discuss about three stage buffers.

3. Explain the memory reference instructions with example.

4. (a) Draw and explain the microprammed control unit
   (b) Compare and contrast the RISC and CISC

5. (a) Discuss the read and write operations in associative memory
   (b) What is virtual memory? With the help of neat sketch, explain the method of virtual to physical address translation.

6. Explain the source and destination initiated transfer using handshaking with neat sketch.

7. Show the step by step multiplication process using booth algorithm with example.

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Subject Code: R16CS2106

II B.Tech I Semester Supple Examinations, March-2022
FORMAL LANGUAGES AND AUTOMATA THEORY
(CSE)

Time: 3 hours   Max Marks: 60

Question Paper Consists of **Part-A** and **Part-B**.
Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B
All questions carry equal marks of 12.

PART-A

1. (a) Describe the applications of Finite Automata?

(b) What is Chomsky Normal Form?

(c) Compare recursive and recursive enumerable languages.

(d) Define ambiguity in CFG with an example.

(e) What are the Applications of the Pumping Lemma?

(f) Define undecidability. Give an example of undecidable problems.

[2+2+2+2+2+2]

PART-B

4 X 12 = 48

2. (a) Construct a DFA accepting the set of all strings ending with 00?

(b) Differentiate between NFA and DFA.

3. (a) Construct CFG without ε – production from the one which is given below

$S \rightarrow a \mid Ab \mid aBa$

$A \rightarrow b \mid \varepsilon$

$B \rightarrow b \mid A$

(b) Give an overview of the recursively enumerable language.

4. (a) Construct the Moore machine to determine residue mod 3.

(b) Explain the procedure for converting DFA to NFA.

5. (a) Construct the regular expression corresponding to the language accepted by following DFA.
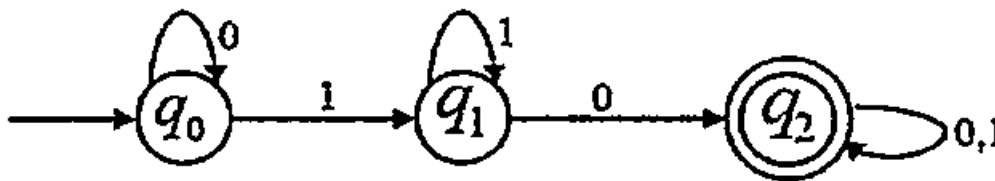
(b) Construct NFA with ε which accepts a language consisting the strings of any number of 0's followed by any number of 1's. And also convert into NFA without ε transitions.

6. (a) Show that for every PDA there exists a CFG such that $L(G) = N(P)$.

(b) Obtain GNF for $S \rightarrow AB$, $A \rightarrow BS/b$, $B \rightarrow SA/a$.

7. (a) Distinguish between class P and class NP Problems.

(b) Design a Turing Machine for $L=\{0^n 1^m : m,n \geq 1\}$.

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