

**3<sup>rd</sup> Semester End Semester Examination: 2023-24**  
**Subject Name: Engineering Economics**  
**BRANCH (Mech, Civil, AG, EEE & ECE): BTech**

**Time: 3 Hour****Max Marks: 100****Q. Code: BT304**

*Answer Question No. 1 (Part-I) which is compulsory, any eight from Part-II and any two from Part-III.*  
*The figures in the right hand margin indicate marks.*

Part - I			
01	Answer the following questions:	$(10 \times 2)$	CO
	a) What is Nominal interest rate?	4	1
	b) What is Net present value ?	4	1
	c) When the price of a good is Rs 12, consumer buys 24 units when price rises to Rs 34, the consumers buy 20 unit, Calculate Price elasticity of demand?	1	1
	d) What is Cost and Benefit analysis?	4	1
	e) What is discount in bill of exchange?	5	1
	f) Write any two basic Problems of an Economy?	1	1
	g) Write any two exceptions of law of supply?	1	1
	h) What do you mean by Revenue dominated cash flow diagram?	4	1
	i) What is Explicit cost in production?	3	1
	j) What is Comprehensive inflation?	5	1
Part-II			
02	Answer any eight questions	$(06 \times 08)$	CO      BT
	a) A bank gives a loan to a company to purchase an equipment worth 10,00,000 at an interest rate of 18% compounded annually .This amount should be repaid in 15 yearly instalments. Find the instalment amount that the company has to pay to the bank.	4	2
	b) A company has to replace a machine after 15 years at an outlay of RS 5,00,000. It plans to deposit an equal amount at the end of every year for the next 15 years at an interest rate of 18% compounded annually. Find the equivalent amount that must be deposited at the end of every year for the next year 15 years.	4	2
	c) A person is planning for his retired life. He has 10 more years of service. He would like to deposit RS 8,500 at the end of the first year and thereafter he wishes to deposit the amount with an annual decrease of RS 500 for the next 9 years with an interest rate of 15%. Find the total amount at the end of the 10th year of the above series.	4	2
	d) Explain the causes of Depreciation?	4	2
	e) Explain the degree of price elasticity of demand.	1	2



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f)	Briefly explain any four causes of inflation.	5	2
g)	What is Break-even point. Show the Breakeven point with the help of diagram?	5	2
h)	Write short notes on variable cost with diagram.	3	2
i)	What are the different types of loan provided by the commercial bank.	5	2
j)	What are the difference between average cost & marginal cost.	3	2
k)	What are the difference between short run & long run production function.	2	2
l)	Write the exception of law of demand.	1	2

## Part-III

Answer any Two questions from the Q-3 to Q-6

(16 x 2)

CO BT

03	a) Explain any two methods of measuring price elasticity of demand.  b) Explain the law of supply with limitations.	1	3
04	a) What is oligopoly Market? Explain the features of Oligopoly.  b) Explain the function of commercial bank.	3	3
05	a) Consider the following data of a company for the year 2020  Sales =1,20,000 Fixed cost=25,000 Variable cost=45,000 find (i)Contribution (ii)Profit (iii)P/V ratio (iv)BEP (v)MS	4	3
	b) A company purchased an equipment whose first cost is 1,00,000 with an estimated life of 8 years. The estimate salvage value of the equipment at the end of its life time is Rs 20,000. Find the depreciation and book for the various years by using sum of year digits method of depreciation.	4	3
06	a) LIC accepts Rs 10,000 at the end of every year for 20 years and pays the investor Rs 8,00,000 at the end of 20th year. Bajaj Allianz accepts RS 10,000 at the end of every year for 20 years and pays the investor 15,00,000 at the end of 25th year. Which is the best alternatives by present worth method with i=12%.	4	3
	b) A company purchased an equipment whose first cost is 1,00,000 with an estimated life of 8 years .The estimate salvage value of the equipment at the end of its life time is Rs 20,000.Determine the depreciation charge and book value by using declining balance method of depreciation by assuming K=0.2	4	3

**3<sup>rd</sup> Semester Improvement End Semester Examination: 2023-24**  
**Applied Mathematics**  
**BRANCH(S): B.Tech (AG, ME & CE)**

Time : 3 Hour

Max Marks: 100

Q. Code: 23BT3102

*Answer Question No. I (Part-I) which is compulsory, any eight from Part-II and any two from Part-III.*  
*The figures in the right hand margin indicate marks.*

Part - I		
01	Answer the following questions:	(16 x 2)
a)	What is the Normal form of the equation $u_{xx} + 4u_{xy} + 4u_{yy} = 0$ .	3
b)	Solve $u_y = u$ .	3
c)	Write down the two dimensional Wave equation?	3
d)	Let X be normal with mean 10 and variance 4, then find $P(X > 12)$ .	4
e)	Find the mean and variance of the probability density function $f(x) = 2x (0 \leq x \leq 1)$	4
f)	If the density function $f(x) = \frac{1}{4}(2 < x < 6)$ , then find C such that $P(X \leq C) = 90\%$ .	4
g)	If the density function $f(x) = \frac{1}{4}(2 < x < 6)$ , then find $P(X \geq 4)$ .	4
h)	Write the Cauchy Riemann Equations.	4
i)	Find $L\{e^{5t}\}$ .	1
j)	What is linearity in Laplace transformation?	1
Part-II		
Answer any eight questions		(06 x 08)
02	a) In rolling of two fair dice what is the probability of obtaining a sum greater than 3 but not exceeding 6?	4
b)	If a certain kind of tyre (in thousands of miles) has the density $f(x) = \theta e^{-\theta x} (x > 0)$ , what mileage can you expect to get on one of these tyres? Let $\theta = 0.05$ and find the probability that a tyre will last at least 30,000 miles?	4
c)	If the probability of hitting a target is 25% and 4 shots are fired independently, what is the probability that the target will hit at least once?	4
3	d) Find the Laplace inverse of $\frac{-s-10}{s^2-s-2}$	1
e)	If the lifetime X of a certain kind of automobile battery is normally distributed with a mean of 5 years and standard deviation 1 year, and the manufacturer wishes to guarantee the battery for 4 years, what percentage of the batteries will he have to replace under the guarantee?	4
f)	Let X be normal with mean 50 and variance 9, determine c such that : (i) $P(X > c) = 1\%$ ,      (ii) $P(X < c) = 5\%$	4
4	g) Solve $u_x + u_y = 0$	3
h)	Find the deflection of the string where $L = \pi, c^2 = 1$ , the initial velocity is zero, and the	3



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		initial deflection is $f(x) = 0.01 \sin 3x$ .
8)	i)	Find the Fourier series of $f(x) = \begin{cases} 1, & -1 < x < 0 \\ 0, & 0 < x < 1 \end{cases}$
9)	j)	Find the inverse of $\ln \frac{s^2 + 1}{s^2 + 9}$
	k)	Find Fourier transform $f(x) = \begin{cases} 1, & \text{if } a \leq x < b \\ 0, & \text{otherwise} \end{cases}$
6	l)	Solve $y'' + 3y = 10 \sin t, y(0) = 0$

### Part-III

Answer any Two questions from the Q-3 to Q-6

(16 x 2)

03	a)	Find the Fourier series of $f(x) = x, -\pi < x < \pi$ ?
	b)	$y(t) = t + \int_0^t y(\tau) \sin(t - \tau) d\tau$ Solve:
04	a)	Find Fourier sine integral $f(x) = \begin{cases} 1, & \text{if } 0 \leq x < 1 \\ 0, & \text{if } x > 1 \end{cases}$
	b)	If $f(z) = z^6$ , then Check whether the function is analytic or not.
05	a)	Classical experiments by Rutherford in 1910 showed that the number of alpha particles emitted per second in a radioactive process is a random variable X having a Poisson distribution. If X has the mean 0.5, what is the probability of observing two or more particles during any given second?
	b)	Find the temperature $u(x, t)$ in a bar of silver (length 10cm, constant cross section of area $1 \text{ cm}^2$ , density $10.6 \text{ gm./cm}^3$ , thermal conductivity $1.04 \text{ Cal/cm sec C}$ , specific heat $0.056 \text{ Cal/gm. C}$ , that is perfectly insulated laterally, whose ends are kept at 0 degree C and initial temperature is $f(x) = \sin 0.1 \pi x$ .
06	a)	Find the Fourier series of $f(x) = \begin{cases} k, & \text{if } -\frac{\pi}{2} \leq x < \frac{\pi}{2} \\ 0, & \text{if } \frac{\pi}{2} \leq x < \frac{3\pi}{2} \end{cases}$ , then show that $1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \dots = \frac{\pi}{4}$
	b)	Solve $y'' + 16y = 4\delta(t - \pi), y(0) = 2, y'(0) = 0$ using Laplace transformation.

Time:3 Hour

**3<sup>rd</sup> Semester End Semester Examination: 2023-24**  
**Subject Name: Mechanics of solid**  
**BRANCH (Civil): BTech**

**Answer Question No. I (Part-I) which is compulsory, any eight from Part-II and any two from Part-III.**  
**The figures in the right hand margin indicate marks.**

Q. Code: BT309

Max Marks: 100

Part - I		(10 x 2)	CO
<b>01</b>	<b>Answer the following questions:</b>		
a)	State Hooke's law.	1	
b)	Define modular ratio, Poisson's ratio	1	
c)	Draw stress – strain diagram for mild steel and indicate salient points.	2	
d)	Define Factor of safety.	2	
e)	List the types of supports	3	
f)	What do you meant by point of contraflexure?	3	
g)	What is meant by equivalent length of columns?	4	
h)	State the two theorems in moment area method?	4	
i)	Write Torsional equation.	5	
j)	How will you apply a moment to produce torque in a shaft?	5	
Part-II		(06 x 08)	CO
<b>Answer any eight questions</b>			
<b>02</b>	a)	1	
	b)	1	
	c)	2	
	d)	2	
	e)	3	
	f)	3	
	g)	4	
	h)	4	



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	i)	Draw the Mohr's circle for a state of pure shear and indicate the principal stresses.	4
	j)	What are the assumptions made in the theory of torsion?	5
	k)	What is the power transmitted by circular shaft subjected to a torque of 700 KN-m at 110 rpm?	3
	l)	Distinguish between flexural rigidity and torsional rigidity.	5
	<b>Part-III</b>		
	Answer any Two questions from the Q-3 to Q-6		
	(16 x 2)		
03	a)	Rails are laid such that there is no stress in them at 24°C. If the rails are 32m long, Determine the stress in the rail at 80°C when there is no allowance for expansion	2
	b)	Also determine the stress in the rail at 80°C when there is expansion allowance of 8 mm per rail.	3
04	a)	A 10-m long beam ABC is simply supported at A and B, B being 2 m from the right end of the beam. It carries point loads of 8 kN and 4 kN at distances 3 m and 5 m from A. The beam also has uniformly distributed loads of intensity 4 kN/m for a distance of 4 m starting from A and of 6 kN/m on BC. Draw the shear-force and bending-moment diagrams indicating principal values.	3
	b)	Also find the maximum bending moment in the span.	4
05	a)	Derive the Euler's buckling load for a column with both ends hinged	4
	b)	Derive the Euler's buckling load for a column with both ends fixed	5
06	a)	A hollow straight shaft of 10cm external diameter and 5cm internal diameter transmit 600KN at 500 rpm and is subjected to an end thrust of 50KN. Find what bending moment maybe safely applied to the shaft if the greater principal stress is not to exceed 100N/mm <sup>2</sup> .	5
	b)	What will be the value of smaller principal stress.	5

\* BTL: Bloom's Taxonomy Level

\* CO: Course Outcomes

3<sup>rd</sup> Semester End Semester Examination: 2023-24  
Subject Name: OOPs using Java  
BRANCH(S): BTech

Time: 3 Hour

Max Marks: 100

Q. Code: BT317

*The figures in the right hand margin indicate marks.*

Part - I			
01	Answer the following questions:	(10 x 2)	CO      BTL
a)	What do you know by java byte code?	1	2
b)	Why is the main method static in Java?	1	2
c)	What happens when a class doesn't contain any constructor? How its data members are initialized?	2	2
d)	Write difference between final and finally keyword in java?	2	2
e)	Differentiate between compile-time and runtime polymorphism.	3	2
f)	Explain equals() and compareTo() methods of String class.	3	2
g)	Find output. String s1="125",s2="251"; int n1=Integer.parseInt(s1),n2= Integer.parseInt(s2); System.out.println(s1+s2); System.out.println(n1+n2+Integer.parseInt(s1+s2));	4	2
h)	Define the term package. Name any 5 java library packages.	4	2
i)	Differentiate between sleep() and wait() method in multithreading in java.	5	2
j)	Explain the role of the "TextField" class in AWT.	6	2
Part-II			
	Answer any eight questions	(06 x 08)	CO      BTL
02	a) Explain instance variables, local variables and argument variables with suitable example.	2	3
b)	Write a java program to print the greatest and smallest of N integers.	1	3
c)	Write a java program that defines a class 'Rectangle' with instance variables for length and width. The class also contains a parameterized constructor and methods to display the instance variables and also a method to compare length and width of a rectangle.	2	3
d)	Write a Java program to calculate the ratio of male to female voters among N voters of class "Voter" with instance variables 'name' and 'gender'.	2	3



	e)	Write an example program to show constructor overloading in a class 'Employee' with instance variables name and age.	3	
	d)	Write a Java program that takes a string as input and counts the total number of alphabets, digits and special symbols present in it.	3	4
	g)	Explain the concept of Wrapper classes, boxing and unboxing in java.	4	3
	h)	Provide an example of creating and using a custom package.	4	3
	i)	Define the term "thread priority" in Java. How can you assign and get the priority of a thread.	5	3
	j)	What do you know by thread synchronization? How can you achieve it?	5	3
	k)	How do you use try-catch blocks for handling exceptions in Java?	6	3
	l)	Write a java program to design a Login frame using awt components.	6	3
	<b>Part-III</b> <b>Answer any Two questions from the Q-3 to Q-6</b> (16 x 2)			CO      BTL
03	a)	Write a Java program to print the common elements present in two different arrays of integers.	1	3
	b)	Imagine you have an abstract class called "Bank" that offers functionality to determine the rate of interest through the method interest Rate(). Generate subclasses named SBI, ICICI, and AXIS banks. These subclasses should specify interest rates of 8%, 7.5%, and 9%, respectively. Write a java program for it.	2	4
04	a)	Write a program to overload a method sum() as follows: i) int sum(int n)- To calculate and return sum of all multiples of 3 up to n. ii) int sum(int m , int n)- To calculate and return sum of all numbers between m and n which are divisible by 3 or 5.	3	3
	b)	Write a Java program to provide an example of using an interface to achieve multiple inheritances.	3	4
05	a)	Design a frame in java to accept students Name, Roll No, Branch , Year, CGPA and Grade by using Label, text Field and a suitable layout manager.	6	3
	b)	Define inheritance. Explain different types of inheritance by taking real world examples.	4	3
06	a)	Describe the various states a thread can be in during its lifecycle in Java.	5	3
	b)	Write a program to accept a number and print whether or not it is a lead number. A number is said to be a lead number if its sum of even digits is same as sum of odd digits. Eg. 72344 $7+3=2+4+4$	1	3

3<sup>rd</sup> Semester End Semester Examination: 2023-24  
 Subject Name: Construction Technology  
 BRANCH (Civil): B.Tech

B.Tech  
 BTCE-T-PE-301

Time: 3 Hour

Q. Code: BT314

Max Marks: 100

*The figures in the right hand margin indicate marks.*

01 Answer the following questions:

Part - I

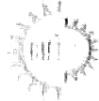
		(16 x 2)	CO	BT
a)	State the names of equipment used in earthwork.		1	1
b)	What is pre stressed concrete?		1	1
c)	Define false work.	2	1	
d)	Write the use of admixtures in concrete.	2	1	
e)	What is ready-mix concrete?	3	1	
f)	What is pointing?	3	2	
g)	Define DPC.	4	2	
h)	Define shotcrete.	4	2	
i)	What is green concrete?	5	3	
j)	Define types of steel.	5	3	

Part-II

Answer any eight questions

(06 x 08)

02 a)	Explain the key principles and objectives of construction technology.	1	2
b)	Elaborate on the significance of accurate construction estimating and how it influences project budgeting.	1	2
c)	Discuss the importance of skilled labour in construction.	2	2
d)	Explain briefly about Fibre reinforced concrete?	2	2
e)	Short note on concrete mixer & pump?	3	3
f)	What do you mean by workability of concrete? Mention the factors affecting Workability?	3	3
g)	Explain the productivity of mechanized construction?	4	2
h)	Identify different types of scaffolding and their applications.	4	3
i)	Outline the purpose and importance of a Damp Proof Course in construction.	4	



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j)	Identify and explain three common causes of defects in buildings, providing examples of each.	5
k)	Explain how regular safety inspections contribute to effective building maintenance	3
l)	List and explain five precautionary measures that building occupants and construction workers should take to enhance safety on construction sites	5

**Part-III**

**Answer any Two questions from the Q-3 to Q-6 (16 x 2)**

03	a)	What are the causes, sources and defects of dampness in building?	2
	b)	Briefly describe about non-destructive test of hardened concrete.	3
04	a)	Elaborate the importance of waterproofing in roofing.	3
	b)	Also discuss common methods used for waterproofing over roofs.	4
05	a)	Explain the role of a roller in construction activities.	4
	b)	Explain its applications and benefits in road and foundation works.	4
06	a)	What is meant by the non-destructive testing of concrete?	5
	b)	Briefly describe the commonly used non-destructive testing methods for testing strength and quality of concrete.	5

\*\* BTL: Bloom's Taxonomy Level

\*\* CO: Course Outcomes

**BTL are:**

1. Remembering, 2. Understanding, 3. Applying, 4. Analysing, 5. Evaluating and 6. Cr

Time: 3 Hour

*Answer Question No. 1 (Part-I) which is compulsory, any eight from Part-II and any two from Part-III*

Q. Code: BT320

Max Marks: 100

*The figures in the right hand margin indicate marks.*

01		Part - I		
		Answer the following questions:		
	a)	Define total pressure & centre of pressure.	(16 x 2)	CO BTL
	b)	How viscosity varies with temperature in case of liquid and gas	1	1
	c)	Explain Absolute, Gauge , atmospheric and Vacuum Pressure, give the relationship between them and show it on the graph	2	2
	d)	What is steady flow & unsteady flow? Give example	2	2
	e)	Define HGL & TEL.	3	1
	f)	List various losses in flow through pipes	3	1
	g)	What do you mean by mixed flow turbine	4	2
	h)	Pelton turbine is a high..... turbine whereas Francis Turbine is a..... turbine	4	3
	i)	What is a centrifugal pump?	5	1
	j)	Write down the formulae for work done by a double acting reciprocating pump.	5	3
02		Part-II	CO	BT
		Answer any eight questions	(06 x 08)	
	a)	Calculate the capillary rise in glass tube of 2.5mm dia. when immersed vertically in a) water and b) mercury. Take surface tension $\sigma = 0.0725 \text{ N/m}$ for water and $\sigma = 0.52 \text{ N/m}$ for mercury in contact with air. Sp. gravity of mercury is given as 13.6 and angle of contact is $130^\circ$	2	3
	b)	Determine the experimental method for metacentric height measurement with proper derivation and diagram.	1	6
	c)	What is velocity potential & stream function. Derive a relationship between them	3	2
	d)	The velocity component $\phi$ is given by the equation $\phi = -\frac{1}{3}xy^3 - x^2 + \frac{1}{3}x^3y + y^2$ . Show that $\phi$ represent a case of steady flow. Find out velocity component in X & Y direction.	3	3
	e)	What are pipes in series and pipes in parallel. Describe with a diagram?	3	
	f)	A main pipe divides into two parallel pipes which again forms one pipe. The length and diameter for the first parallel pipe are 2000 m and 1.0 m respectively, while the length and diameter of 2nd parallel pipe are 2000 m and 0.8 m. Find the rate of flow in each parallel pipe, if total flow in the main is $3.0 \text{ m}^3/\text{s}$ . The co-efficient of friction for each parallel pipe is same and equal to .005.	3	



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g)	Draw the velocity triangle diagram of a typical pelton turbine mentioning the various assumptions.	4	6
h)	Find the volume of water displaced and the position of center of buoyancy for a block of wood having width 2.9 m and depth 1.40 m, when it floats horizontally in water. The density of wooden block is $650 \text{ Kg/m}^3$ and the length is 7 m.	1	3
i)	Describe the working principle of a reciprocating pump with a neat sketch.	5	6
j)	Differentiate between turbines and pumps	5	2
k)	What is the importance of a manometer? Explain the types of manometers in brief	2	2
l)	Derive an expression for maximum power transmission through a nozzle.	3	3

**Part-III**

Answer any Two questions from the Q-3 to Q-6

(16 x 2)

3	a)	Define path line, streak line, stream line with proper diagram.	3	1
4	b)	Derive the expression for continuity equation for a three-dimensional fluid flow.	3	3
4	a)	Describe the classification of manometers	2	2
4	b)	A simple U-tube manometer containing mercury is connected to a pipe in which a fluid of specific gravity 0.8 and having vacuum pressure is flowing. The other end of the manometer is open to atmosphere. Find the vacuum pressure in pipe, if the difference of mercury level in the two limbs is 40 cm and the height of fluid in the left from the centre of pipe is 15 cm below.	2	3
5	a)	Describe the applications of Bernoulli's equation to Orifice, Venturi and Pitot tube with neat sketch.	3	6
5	b)	A pipe of diameter 400mm carries a water at a velocity of 25m/s. The pressures at points A and B are $29.43 \text{ N/cm}^2$ and $22.563 \text{ N/cm}^2$ while datum head at A and B are 28m and 30m respectively. Find the loss of head between A and B.	3	3
6	a)	Compare between Centrifugal and reciprocating pumps .	5	4
6	b)	2b) A single acting reciprocating pump, running at 50 r.p.m delivers at 0.01 cumec of water. The diameter of the piston is 200 mm and stroke length 400mm. Determine : i) theoretical discharge of the pump ii) coeff of discharge iii) slip and percentage slip of the pump.	5	5