

Shri Balasaheb Mane Shikshan Prasarak Mandal, Ambap's
ASHOKRAO MANE GROUP OF INSTITUTIONS

Vathar Tarf Vadgaon-416112 Tal. Hathkangle, Dist Kolhapur

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QUESTION PAPER: (B.Tech/M.Tech/MBA)

Semester: 5th

Class: TY.B.Tech

Year: Feb-2025

Department: All Branch

1. Civil Engineering
2. Mechanical Engineering
3. Computer Science and Engineering
4. Electronics and Tel communication Engineering
5. Electrical Engineering
6. AIDS
7. Computer Science And Electronics Engineering



Instructions to the Students:

1. Each question carries 12 marks.
2. Question No. 1 will be compulsory and multiple objective-type questions.
3. Candidates are required to attempt one full question from Question No. 2 to Question No. 4.
4. The level of question expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in () in front of the question.
5. Use of non-programmable scientific calculator is allowed.
6. Assume suitable data wherever necessary and mention it clearly.

		(Level/CO)	Marks
Q. 1	Objective type questions. (Compulsory Question)		12
	The Oceanic Trenches are primarily associated with:	(BL-1/CO1)	
	a. Fold mountains b. Shield volcanoes c. Lava flows d. Plate boundaries		
	Conchoidal rock formations often contain:	(BL-1/CO1)	
	a. Quartz veins b. Coal seams c. Gold deposits d. Basalt flows		
	The primary source of metamorphic water is:	(BL-2/CO1)	
	a. Volcanic eruptions b. Rayolite and snowmelt c. Ocean water infiltration d. Magmatic activity		
	An aquifer is defined as:	(BL-1/CO2)	1
	a. A rock layer that stores and transmits water b. A dry rock formation c. A fault zone with water d. A completely impermeable layer		
	Compact head is preferred as construction material because of its:	(BL-2/CO3)	
	a. High porosity b. High compressive strength c. High ductility d. Resistance to chemical weathering		
	How does jointing in compact head affects engineering properties?	(BL-2/CO3)	
	a. Increases strength b. Reduces its load-bearing capacity c. Makes it impermeable d. Enhances resistance to erosion		

7	Laterites are commonly used as:				(BL1CO4)	062179672
	a. Aggregates in concrete	b. Foundation material for heavy structures	c. Building stones for load-bearing walls	d. Road construction material	(BL1CO4)	
	A key component of soil derived from basalt is:				(BL1CO4)	
	a. Quartz	b. Feldspar	c. Montmorillonite clay	d. Limestone	(BL1CO4)	
8	Soil genesis refers to the process of:				(BL2CO5)	062179672
	a. Soil erosion	b. Soil formation	c. Soil classification	d. Soil transportation	(BL2CO5)	
	Rocks with high porosity tend to have:				(BL1CO5)	
	a. High compressive strength	b. Low compressive strength	c. High elasticity	d. Uniform stress distribution	(BL1CO5)	
11	The theory of plate tectonics explains:				(BL2CO5)	062179672
	a. Distribution of earthquakes and volcanoes	b. Sedimentation processes	c. Soil formation and erosion	d. Rock weathering	(BL2CO5)	
	Landslides in the Deccan Trap region are often triggered by:				(BL2CO5)	
	a. Heavy rainfall and earthquakes	b. Divergent boundary	c. Lack of vegetation	d. Mining activities	(BL2CO5)	
Solve the following.						062179672
12	Describe the geological time scale and elaborate its role in interpreting Earth's evolutionary history.				(BL2CO1)	
	Discuss the formation of the Deccan Traps. Explain their origin, geographical spread, and associated engineering problems.				(BL2CO1)	
	Solve the following.				(BL2CO1)	
	Explain the difference between confined and unconfined aquifers with a neat labelled diagram.				(BL2CO1)	
13	Give a detailed account of Rock Mass Rating with its merits and demerits.				(BL4CO1)	062179672
	Solve Any Two of the following.				(BL2CO1)	
	A. Evaluate how joint patterns in Deccan Trap basaltic affect their performance as tunneling material.				(BL2CO1)	
	B. Describe the formation process of laterites and their advantages and limitations as a construction material.				(BL2CO1)	
14	Write a note on types of dykes and their role in civil engineering.				(BL1CO1)	062179672

Q.5	Solve Any Two of the following.		12
A)	Discuss the engineering properties of adhesion with, highlighting their advantages and disadvantages for construction purposes.	(BL46/121)	•
B)	Describe the distinctive features of black cotton soil and analyse its impact on the stability and design of civil engineering structures.	(BL54/105)	•
	Explain the significance of geophysical methods in civil engineering and their key applications in site investigation.	(BL53/101)	•
Q.6	Solve Any Two of the following.		12
A)	Describe the theories on the origin of seismic activity in the Deccan Trap region.	(BL25/140)	•
B)	Explain in detail about seismic zones in India with neat labelled diagram.	(BL30/140)	•
C)	Provide various landslide prevention strategies in the Deccan Trap region.	(BL34/104)	•

Course & Tech. Branch: Civil Engineering/Civil and Infra Semester IV

Subject Code & Name: BTCVC 501 - Design of Steel Structures - STRUCTURAL DESIGN

Max Marks: 60 Date: 25/02/2025 Duration: 3 Hr.

Instructions to the Students:

1. Each question carries 12 marks.
2. Question No. 1 will be compulsory and include objective type questions.
3. Candidates are required to attempt any four questions from Question No. 2 to Question No. 6.
4. The level of questions expected answer as per COs or the Course Outcome (CO) on which the question is based is mentioned in () in front of the question.
5. Use of non-programmable scientific calculator is allowed.
6. Assume suitable data wherever necessary and mention it clearly.
7. Use of IS 800-1986, 2001, IS-875 is permitted.

	CO	Marks
Q.1 Objective type questions. (Compulsory Question)		12
1. What is one primary advantage of steel structures?	CO1	1
a. Low cost b. Ease of construction and fabrication c. Limited availability of materials d. Free fire resistance		
2. What is the main function of bolted connections in steel structures?	CO1	1
a. To provide aesthetic appeal b. To distribute thermal loads uniformly c. To join steel members securely d. To increase the elasticity of the structure		
3. Which type of connection is considered more rigid and reliable in steel structures?	CO1	1
a. Bolted b. Bolted c. Welded d. Threaded		
4. Which failure mode is common in bolted connections under excessive tensile force?	CO1	1
a. Shear failure of the bolt b. Bearing failure of the plate c. Rupture of the bolt d. Tearing of the connected plate		
5. Compression members are more prone to	CO3	1
a. Buckling failure b. Tearing failure c. Tensile failure d. Shear failure		
6. Which of the following parameters is used to calculate the effective area of a tension member?	CO3	1
a. Gross area and gauge length b. Gross area and shear lag factor c. Net area and modulus of elasticity d. Radius of gyration and net area		

7. For a compression member with both ends fixed, the effective length factor (K) is:
 a. 1.0 b. 0.65 c. 0.5 d. 2.0 CO3 1
8. In a laterally unsupported beam, failure occurs primarily due to:
 a. Shear stress b. Local buckling of the web c. Lateral torsional buckling d. Bending stress CO3 1
9. Web stiffeners in a beam are used to resist:
 a. Shear forces and prevent web buckling b. Bending moment and torsion c. Axial compression and lateral buckling d. Torsional deformation CO1 1
10. The most common force acting on a gantry girder is:
 a. Axial tension b. Vertical load and lateral thrust from crane operation c. Wind load from the roof d. Shear force from pulley CO1 1
11. The formation of a plastic hinge in a beam indicates:
 a. The member is undergoing elastic deformation. b. The member has reached its ultimate bending moment capacity. c. The structure is unstable and will collapse immediately. d. The beam is experiencing axial compression CO4 1
12. In Limit State Design, the partial safety factor for material strength is greater than 1 to account for:
 a. Load uncertainty b. Variability in material properties c. Deflection limits d. Dynamic effects CO4 1

Q. Solve the following.

A. Define- 1) Pitch 2) Edge distance

Determine the strength of rivet value of 30 mm dia. rivets connecting 12 mm. thick plate in single shear and in bearing. Permissible stress for rivet in shear and bearing are 80 N/mm² and 250 N/mm² and for plate in bearing is 250 N/mm². CO1 1

- B) 1) Explain different types of loads acting on an industrial building
 2) Explain the term Permissible stresses and state the permissible stresses in axial tension, axial compression, bending CO1 1

Q.7	Solve the following.	12
A)	Bottom flange of a 16 mm roof truss is subjected to a tension of 52.5 kN. Design the flange using angle section.	CO1
B)	Explain with neat sketches web buckling & web crippling.	CO3
Q.8	Solve Any Two of the following.	12
A)	A truss of span 18 m, and of 6m spacing between trusses are used in the region where there is no snowfall. The pressure intensity due to wind is 1500 N/m^2 . S.L. sheets are used for roofing. Calculate Dead load and live load per panel point.	CO1
B)	Explain the role of purlins in a roof structure and their design.	CO3
C)	Explain the different loads considered in the design of Gantry girder.	CO3
Q.9	Solve Any Two of the following.	12
A)	Design a single angle discontinuous strut to carry a load of 80 kN. The length of strut between the connections is 3m. Consider that angles are provided on opposite side of 12 mm gusset plate and assuming allowable compressive stress as 60 MPa design the strut.	CO1
B)	Explain with neat sketches lacing and batten systems in detail.	CO2
C)	What are the different types of column bases? Explain with neat sketches.	CO2
Q.10	Solve Any Two of the following.	12
A)	Explain the process of hinge formation in a beam during plastic analysis.	CO4
B)	Explain the major differences between the working stress method and limit state method as per IS 800-2007.	CO4
C)	How steel structure design based on plastic analysis method differs from elastic design method.	CO4

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Dr. Babasaheb Ambedkar Technological University

Regular and Supplementary Winter Examination – 2023

Course: B. Tech.

Branch: Civil Engineering

Semester: V

Subject Code & Name: CV502-TSM Structural Mechanics II CV502_T17

Max.Marks: 60

Date: 06/02/2023

Duration: 3 Hrs.

Instructions to the Students:

1. Each question carries 12 marks

2. A Question No. 1 will be compulsory and it has objective type questions

3. Candidates are required to attempt any 05 questions from Q. No. 2 to Q. No. 6

4. The level of question/expected answer will be COB or the Course Outcome (CO) as which

question is based is mentioned in () in front of the question.

5. Use of non-programmable scientific calculators is allowed.

6. Assume suitable data whenever necessary and mention it clearly.

B.1 Objective type questions. (Compulsory Question)

1. Muller Breslau Principle in structural analysis is used for ———

a) Drawing influence line diagram for any force function

b) Writing virtual work equation

c) Superposition of load effects

d) None of these

The influence line for a reaction in a simply supported beam is —

a) parallel to rectangle

b) straight line

c) hyperbola

In a suspension bridge, the cable is assumed to take the shape of a parabola under uniformly distributed load. The tension in the cable is maximum at

(a) The center of the span

(b) The supports

(c) The quarter points of the span

(d) None of the above

2. A three-finger arch is statically determinate because

(a) it has three fingers

(b) it has four reactions

(c) it has two fingers and one roller support

(d) it has two fingers and one fixed support

In a suspension bridge, the shape of the cable under its own weight is a

a) Parabola

b) Catenary

c) Circle

d) Ellipse

The flexibility matrix method is used for the analysis of —

a) Statically determinate structures

b) Statically indeterminate structures

c) Both statically determinate and indeterminate structures

d) None of the above

7	In a linear elastic structural element — a) Stiffness is directly proportional to stiffness b) stiffness is equal to flexibility c) Stiffness is inversely proportional to stiffness d) Stiffness and flexibility are not related	CO4	II
8	Unit for stiffness is — a) N-m b) kN-mm c) N/m d) Both a & b	CO4	II
9	In finite element modeling every element connects to a) 4 nodes b) 3 nodes c) 2 nodes d) infinite No of Nodes	CO5	II
10	For truss analysis, which type of elements are used a) Triangle b) Rect c) Rectangle d) Parallelogram	CO5	II
11	The stiffness coefficient k_{ij} indicates — A) force at i due to a unit deformation at j B) deformation at i due to a unit deformation at j C) deformation at i due to a unit deformation at j D) force at j due to a unit deformation at i	CO5	II
12	Which of the following is the primary purpose of the Finite Difference Method in numerical analysis? a) To solve algebraic equations b) To analyze statistical data c) To approximate derivatives by using difference equations d) To determine exact solutions for differential equations	CO1	II
13	Solve the following. A uniformly distributed load of 20 kN/m covering a length of 2 m crosses a girder of span 10 m. Find the maximum shear force and bending moment at a section 5 m from L. H. support.	CO1	III
14	A uniformly distributed load of 100 kN/m longer than the span rolls over a girder of 20 m span. Using Influence Line diagram for shear force (SF) and bending moment (BM) determine the maximum SF & BM at a section 12 m from left hand support A.	CO1	III
Q.3	Solve the following. A three hinged arch of span 40 m and rise 8 m carries a concentrated loads of 200 kN and 150 kN at a distance of 8 m and 16 m from the left end and a uniformly distributed load of 250 kN/m on the right half of the span. Find the horizontal thrust.	CO2	III
Q.4	A suspension bridge is of 50 m span and carries a 16 m wide roadway. It is subjected to a load of 25 kN/m ² including dead loads. The bridge is supported by a pair of cables having a central dip of 4.2 m. Find the cross-sectional area of the cable if the maximum permissible stress in the cable material is not to exceed 600 N/mm ² .	CO2	III

Q. 4 Solve **Any Two** of the following.

A) State and explain the steps for analysis of indeterminate structures by Direct Flexibility method.

CO3

10

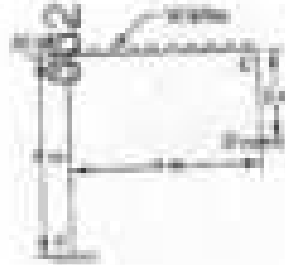
B) Two span continuous beam ABC of span AB 4 m & span BC 3 m with support A as fixed, support B (middle support) and C as roller support. Span AB is subjected to UDL of 60 kN/m. Span BC is subjected 100 kN at distance 1.5 m from C. Draw SFD and BMD. Use Direct Flexibility method.

CO3

6

Analyze the portal frame ABCD as shown in the figure below by flexibility Matrix Method.

CO3



Q. 5 Solve **Any Two** of the following.

A) State and explain the steps for analysis of indeterminate structures by Direct Stiffness method.

CO4

10

B) Two span continuous beam ABC of span AB 4 m & span BC 3 m with support A as fixed, support B (middle support) and C as roller support. Span AB is subjected to UDL of 60 kN/m. Span BC is subjected 100 kN at distance 1.5 m from C. Draw SFD and BMD. Use Direct Stiffness method (i.e. Displacement method).

CO4

6

C) Explain in detail the finite difference method.

CO4

6

Q. 6 Solve **Any Two** of the following.

A) What is meant by 'Discretisation' in finite element analysis. List the different elements & guidelines used for discretisation of any complex geometry and explain them in detail.

CO5

10

B) What are the pros and cons of Finite Element Method.

CO6

6

C) Derive shape function for bar element.

CO6

8

*** E ***

Course: B.Tech.

Branch :Civil Engineering

Semester : V

Subject Code & Name: BTCVC022 & Structural Mechanics-II (BTCVC022_F18)

Max Marks: 60

Date: 08/03/2025

Duration: 1 Hr.

Instructions to the Students:

1. Each question carries 1/2 marks.
2. Question No. 1 will be compulsory and includes objective type questions.
3. Candidates are required to attempt any 10 questions from Question No. 2 to Question No. 11.
4. The level of questions/expected answer is in line with the OBE or the Course Outcome (CO) on which the question is based is mentioned in / / is part of the question.
5. Use of non-programmable scientific calculator is allowed.
6. Assume suitable data wherever necessary, if mention it clearly.

(Level/CO)

Q. 1 Objective type questions. (Compulsory Question)

1. Basic indeterminacy for pin jointed plane frame is given by
 a. $(m + r) - 2$ b. $(m + r) - 3$ c. $(3m + r) - 3$ d. $3m + r - 3$
2. For drawing I.D, what value of test load is assumed?
 a. Arbitrary b. 1 unit c. Depends upon structure d. 0
3. Calculate the horizontal thrust for the two hinged parabolic arch loaded uniformly throughout with distributed load w .
 a. $wL^2/16H$ b. $wL^2/32H$ c. $wL^2/8H$ d. $wL^2/24H$
4. In an indeterminate structure, when there is no lack of fit, the partial derivative of strain energy with respect to any of the redundant
 a. will give deflection in the direction of redundant b. will give slope in the direction of redundant c. is 0 d. is zero
5. The shape of the cable, when loaded with uniformly distributed load throughout the span is
 a. Linear always b. Parabolic always c. Trapezoidal always d. Linear or parabolic depending upon the intensity of loading
6. A beam is stiffest for
 a. far end is hinged b. far end is fixed c. far end is roller support d. None of these
7. When a structural member of the uniform section is subjected to a moment at one end only, then the moment required at A to rotate that end to produce a unit slope, is called
 a. Resistance of member b. Stiffness of member c. Capacity of member d. Potential of member
8. Stiffness of the end A if the far end B is fixed is ____
 a. $4EI/L$ b. $2EI/L$ c. $3EI/L$ d. $4EI/L$

19. Which of the following methods of structural analysis is a Force Method.
- a. Three-moment theorem
b. Flexibility matrix method
c. Stiffness Matrix method
d. None of these

20. For beam shown below, the flexibility Coefficient F_{22} can be written as

- a. $\frac{1}{3EI}$
b. $\frac{1}{6EI}$
c. $\frac{1}{12EI}$
d. None of these

In one dimensional problem, each node has _____ degree of freedom

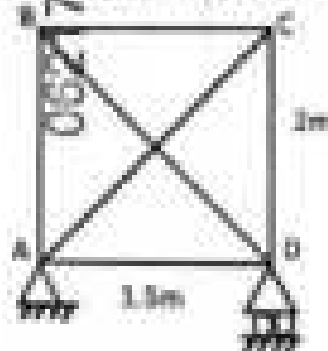
- a. 2 degrees of freedom
b. 3 degrees of freedom
c. no degrees of freedom
d. 1 degree of freedom

21. Discretization includes _____ numbering.

- a. Element and node
b. Only nodal
c. Only elemental
d. Either nodal or elemental

Q.2 Solve the following.

- a) While fabricating the pin-jointed frame shown in fig. the member AC was the last member to be fitted, and was found to be 1 mm short of the required length. Find the forces in all the members of the frame when the member AC is forced into position. The diagonal members are each 1000 mm² in area. While the remaining members are 2000 mm² in area. Take $E = 200 \text{ kN/mm}^2$.



The load system shown in fig. moves from right to left on a girder of span 20 m. Find the maximum shear force at a section 7.5m from the left end.



Q.2 Solve the following.

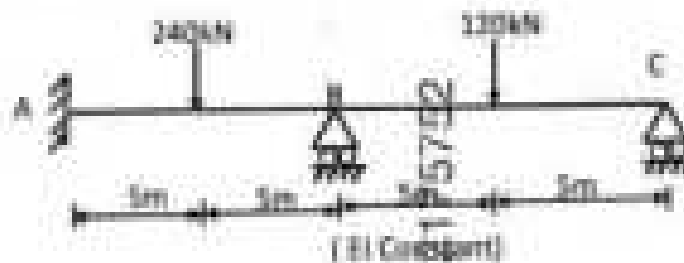
- A) A cable is supported between two points 10m horizontally apart. The left support is 3m above the right support. The cable carries a load of 2kN/m on the horizontal span. The lowest point of the cable is 1m below the left support. Find the maximum tension in the cable.

- B) A three hinged parabolic arch has span of 30m and a rise of 10m. It carries a UDL of 20 kN per meter over the left half of the span and a point load of 120kN at 10m from the right end. Find the bending moment, normal thrust and radial thrust at a section 4m from the left end.

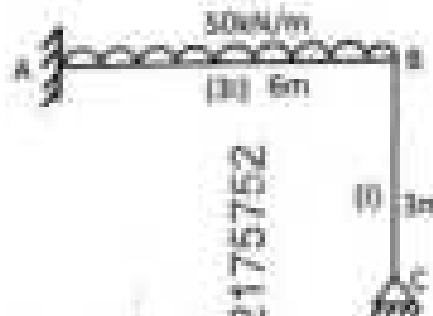
Solve Any Two of the following:

- a) Draw and explain the steps for analysis of indeterminate structures as proper cantilever, fixed beam, continuous beam, propped beam and rigid jointed beam by Direct Flexibility method.

- b) Analyse the continuous beam shown in Fig. By Force method.



- c) Analyse the frame shown in Fig. By Flexibility method.

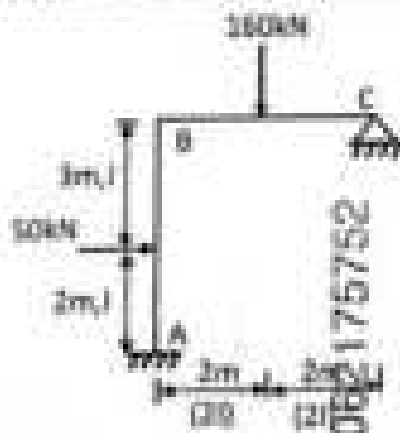


Q.8 Solve Any Two of the following.

- What is the Relation Between the Stiffness matrix and Flexibility Matrix.
- Analyze the continuous beam shown in Fig. By stiffness method.



- Analyze the frame shown in Fig. By Displacement method.



Q.9 Solve Any Two of the following.

- Write a note on Pascal's Triangle.
- Explain Plane Stress and Plane Strain condition.
- Explain the stress Distribution.



DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Regular/Supplementary Winter Examination – 2024

Course: B.Tech. Branch: Civil Engineering Semester: IV

Subject Code & Name: BPC40303 Geotechnical Engineering

Max. Marks: 60

Date: 29/03/2025

Duration: 3 hr

Instructions to the Students:

1. Each question carries 17 marks.
2. Question No. 1 will be compulsory and include objective type questions.
3. Candidates are required to attempt any four questions from Question No. 2 to Question No. 6.
4. The level of questions/expected answer is BLOBS in the Course Outcome (CO) in which the question is based is mentioned in () in front of the question.
5. Use of non-programmable scientific calculator is allowed.
6. Assume suitable data wherever necessary and mention it clearly.

		Level/CO	Marks
Q. 1	Objective type questions. (Compulsory Question)		17
1	Dry soil is a ——— phase system	1/3	1
	a. one b. Two c. Three d. Four		
2	The soil having particles of variety of sizes is said to be ———	1/3	1
	a. Well graded b. Gap graded c. Poorly graded d. Uniformly graded		
3	The specific gravity of a soil solids can be determined by using ———	1/3	1
	a. Sieve b. Pycnometer c. Hydrometer d. Oven		
4	The constant head permeability test is suitable for ———	1/3	1
	a. CO soil b. FG soil c. CG & FG soil d. None		
5	The critical soil gradient for the seepage of water out of a soil is ———	1/3	1
	a. $\frac{e+1}{1+e}$ b. $\frac{1+e}{1+e}$ c. $\frac{1+e}{1+e}$ d. $\frac{1+e}{1+e}$		
6	A flow net is drawn for a soil. The total head loss is 8m. Number of Potential drops are 8 and the length of flow of path of last flow field is 1m. The soil gradient is ———	1/3	1
	a. 0.5 b. 0.75 c. 0.9 d. 1.15		
7	Deviator's pressure in triaxial soil is known as ——— pressure	1/3	1
	a. cell b. chamber c. cell d. Additional vertical		
8	A purely clayey soil is having unconfined compressive strength of 40kpa. Its cohesion will be ——— kPa	1/3	1
	a. 10 b. 20 c. 40 d. 80		
9	Remoulded strength of soil having undisturbed strength 50kPa and sensitivity of 2 is ——— kPa	1/3	1

	a. 25	b. 50	c. 75	d. 100																
10	In a compaction test, as a compaction effort is increased, the optimum water content				1/4															
	a. Decreases	b. Remains same	c. Increases	d. Increases first and then decreases																
11	In case of compaction, dry density of soil increases when water content of soil is				1/4															
	a. 0 %	b. 100 %	c. 100 %	d. None																
12	Coefficient of compressibility is the slope of virgin portion of — curve				1/4															
	a. flow	b. compaction	c. $e - \log p$	d. $e - \log p$																
G. 2	Solve the following.					10														
A	Derive relation $v_d = \frac{w_p}{1+w_p}$ use 3 phase labelled diagram.				3/1	*														
B	Following observations were recorded during specific gravity test Find specific gravity of soil. Mass of pycnometer = 85.5gms Mass of pycnometer and dry soil = 85.5gms Mass of pycnometer dry soil and water = 124.5gms Mass of pycnometer and water = 138.5gms				6/1	*														
	Solve the following.					10														
	With a neat labelled sketch explain plasticity chart. Explain meaning of each dual symbol used to classify the soil (Minimum six symbols)				4/2	*														
B	A falling head permeability test was carried out on a 120cm long sample of silty clay. The diameter of sample and the stand pipe were 10cm and 1.5cm, respectively. the water level in stand pipe was observed to fall from 80 to 60cm in 12 min, determine the coefficient of permeability of the soil in m/day				4/2	*														
	Solve any Two of the following.					10														
	Find the average coefficient of permeability and mass made up of three horizontal layers. The first and second layers have the same thickness of 0.6m each. The third layer is 1.2m thick the coefficient of permeability of first, second, and third layers are 1×10^{-7} , 1.2×10^{-7} and 4.5×10^{-7} cm/s, respectively				4/2	*														
B	Direct shear test was conducted on a fine sand using sample of size 60mm X 60mm X 25mm and following results were obtained determine shear parameters of soil.					*														
	<table border="1"> <tr> <td>Normal force (N)</td> <td>80</td> <td>160</td> <td>240</td> <td>320</td> <td>400</td> <td>480</td> </tr> <tr> <td>Shear force (N)</td> <td>50</td> <td>100</td> <td>140</td> <td>200</td> <td>240</td> <td>300</td> </tr> </table>				Normal force (N)	80	160	240	320	400	480	Shear force (N)	50	100	140	200	240	300		
Normal force (N)	80	160	240	320	400	480														
Shear force (N)	50	100	140	200	240	300														

Q	Compare direct shear test and tri-axial shear test (minimum 8 points)	4/2	8
Q.3	Solve Any Two of the following.		12
A)	What is compaction of soil? Discuss with neat illustration sketches factors affecting compaction of soil.	4/3	6
B)	Draw $e-p$ curve for soil? Label different branches of the curve. What are the slopes of these branches?	4/4	6
C)	Calculate total active earth pressure and its position with respect to bottom of wall acting on a retaining wall of height 5m retaining two layered soil on back side of it. Top layer 4.2m thick $\gamma=19kN/m^3$, $c=0$ and $\phi=30^\circ$ followed by second layer having $\gamma=18kN/m^3$, $c=0$ and $\phi=25^\circ$	3/4	6
Q. 4	Solve Any Two of the following.		12
A)	The following data refer to a sample of soil Percent passing 4.75 mm IS Sieve = 64 Percent passing 75 μ IS Sieve = 6 Uniformity Coefficient = 7.5 Coefficient of Curvature = 3.7 Plasticity Index = 3.5 Classify the soil. Draw flowchart of classification to classify soil.	3/3	6
B)	Explain Rankine method to calculate active earth pressure acting on wall with the help of illustrative sketch (use mathematical instruments to draw sketch— avoid freehand sketch)	3/4	6
C)	Draw typical grain size distribution curve for well graded soil. How do you calculate coefficient of curvature and coefficient of uniformity for the soil. What are the values of C_u and C_c for poorly graded soil?	3/1	6
*** End ***			

Regular and Supplementary Winter Examination - 2024

Branch: Civil Engineering

Course: B. Tech.

Semester: V

Subject Code & Name: BTCE503 Structural Mechanics - II

Max Marks: 60

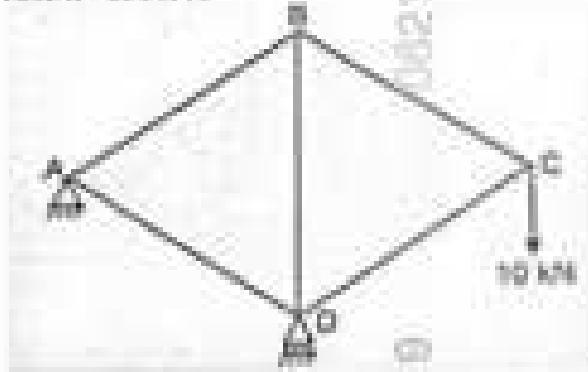
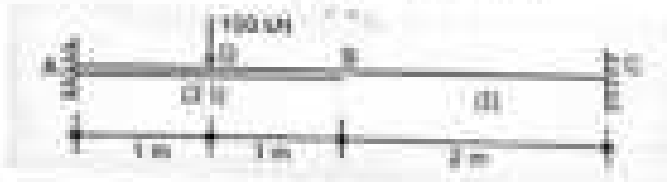
Date: 11/02/2025

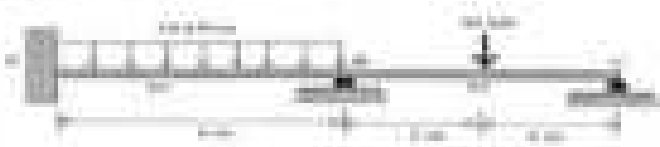
Duration: 3 Hr.

Instructions to the Students:

1. Each question carries 12 marks.
2. Question No. 1 will be compulsory and include objective type questions.
3. Candidates are required to attempt only four questions from Question No. 2 to Question No. 5.
4. The level of questions/expected answer is per OBE and the Course Outcome (CO) on which the question is based is mentioned at () in front of the question.
5. Use of non-programmable scientific calculator is allowed.
6. Assume suitable data wherever necessary and mention it clearly.

	(Level/CO)	Marks
Objective type questions (Compulsory Question)		12
If there are 'm' unknown member forces, 'r' unknown reaction components and 'J' number of joints, then degree of static indeterminacy of a pin jointed plane frame is given by	1	1
a. $m + r + 2J$ b. $m - r + 2J$ c. $m + r - 2J$ d. $m + r - 3J$		
If there are 'm' unknown member forces, 'r' unknown reaction components and 'J' number of joints, then a pin jointed plane frame is unstable if	1	1
a. $(m + r) < 2J$ b. $(m + r) = 2J$ c. $(m + r) > 2J$ d. None of the above		
For an arching I.L.D., what value of test load is assumed?	1	1
a. $\frac{1}{2}$ test b. Arbitrary c. Depends upon arch rise d. 1		
I.L.D. of statically determinate beams consists of curve as well as straight lines.	1	1
a. True b. False		
Cable is a truss member	1	1
a. True b. False		
The shape of the cable, when loaded with uniformly distributed load throughout the span is	1	1
a. Linear always b. Parabolic always c. Trapezoidal always d. Linear or parabolic		
Which of the following conditions forms the basis of Direct Flexibility Method	1	1
a. Equilibrium Condition b. Force-Displacement condition c. Load Applied d. Compatibility Condition		
Flexibility coefficients are used in which of the following method?	1	1
a. Force method b. Displacement method c. Both force and displacement method d. Virtual force method		
Stiffness coefficients are used in which of the following method?	1	1
a. Force method b. Displacement method c. Both force and displacement method d. Virtual force method		
Which of the following conditions forms the basis of Direct Stiffness Method	1	1
a. Equilibrium b. Force-Displacement c. Load Applied d. Compatibility		

	Conditions	Displacement condition		Conditions	
11	If the structure is divided into discrete areas or volumes then it is called as				5
	a. Structure	b. Element	c. Matrix	d. Boundaries	
12	One dimensional element is the linear segments which are used to model				5
	a. Bars and trusses	b. Plates and beams	c. Structures	d. Solids	
Q.2	Solve the following				
A)	A truss consisting of two equilateral triangles is loaded as shown in figure. Determine the horizontal deflection of roller at D. The length of each member is 3m. The C.S. area of all ties are 300mm ² each and that of all struts are 600mm ² each. Take E = 200GPa.				082175519
					
B)	A simply supported beam, CD has span 12m. It is loaded with UDL, 45KN/m, span 5m and starts 3.5m from C. A concentrated load of 50KN is acting at 2m from D. Find Shear Force at 5m from C by ILD method.				082195519
Q.3	Solve the following				
A)	A light cable is supported at two points 20m apart, which are at same level. The cable supports three equidistant point loads of 40KN, 30KN and 20KN from left support. The deflection at first point is found to be 5.0m. Determine the tension in the different segments and total length of Cable.				082175519
B)	A three hinged parabolic arch of 20m span and 5m rise is carrying a point load of 100KN at a section 5m from the left support. Find the value of horizontal thrust and bending moment at a point 7.5m from the right support.				
Q.4	Solve Any Two of the following				
A)	Analyze the beam shown in figure by flexibility method.				082175519
					

Analyze the beam shown in figure by flexibility method if support B sinks by 25mm. Take $EI = 30000 \text{ kNm}^2$ 		
Analyze the beam shown in figure by flexibility method. 	062175519	
Solve Any Two of the following.		12
Develop the stiffness matrix of the beam shown with respect to the 04 degrees of freedom given. 	062175519	
Develop the stiffness matrix of the beam shown with respect to the 04 degrees of freedom given. 	062175519	
Develop the stiffness matrix of the frame shown with respect to the given coordinates. 	062175519	
Solve Any Two of the following.		12
Write short note on types elements used in finite elements analysis method.	5	5
Write short note on Plane stress and Anti-symmetric Problems in finite elements analysis method.	5	5
Write short note on shape functions used in finite elements analysis method.	5	5

Course: B.Tech

Branch: Civil Engineering / Civil & Infra

Semester: IV

Subject Code & Name: Concrete Technology (BTCECN04) (BTCECN04)

Max. Marks: 50

Date: 13/02/2025

Duration: 3

Instructions to the Students:

1. Each question carries 12 marks.
2. Question No. 1 will be compulsory and include objective type questions.
3. Candidates are required to attempt any four questions from Question No. 2 to Question No. 6.
4. The level of questions/examined answer as per B.E. or the Course Outcome (CO) on which question is based is mentioned in () in front of the question.
5. Use of non-programmable scientific calculators is allowed.
6. Assume suitable data wherever necessary and mention it clearly.

Q.1 Objective type questions. (Compulsory Question)

1. Bulking of sand refers to:

- a) Increase in volume due to moisture content.
- b) Decrease in volume due to moisture content.
- c) Increase in volume due to air voids.
- d) Decrease in volume due to air voids.

What is the primary role of water in concrete?

- a) To increase workability.
- b) To activate hydration of cement.
- c) To reduce the cost of construction.
- d) To act as a binder.

2. Which of the following methods is used to measure the workability of fresh concrete?

- a) Slump test.
- b) Compressive strength test.
- c) Flexural strength test.
- d) Air content test.

Segregation in fresh concrete is defined as:

- a) Uniform distribution of water and aggregate.
- b) Separation of coarse aggregate from the rest of the mix.
- c) Increase in air content.
- d) Increase in workability.

3. Which of the following is a common effect of using plasticizers in concrete?

- a) Increased strength.
- b) Reduced workability.
- c) Increased workability.
- d) Increased curing time.

(CO) Marks

12

CO1

1

CO1

1

CO1

1

CO1

1

CO1

1

6. What is the function of air-entraining agents in concrete?

CO2

- a) To increase strength
- b) To improve workability
- c) To reduce permeability
- d) To improve freeze-thaw resistance

7. Which of the following is true about high-performance concrete?

CO1

- a) It has lower strength than conventional concrete
- b) It is designed for better durability and workability
- c) It is only used in low-strength applications
- d) It requires no curing

The term "creep" in concrete refers to:

- a) The shrinkage of concrete over time
- b) The deformation of concrete under sustained load
- c) The loss of strength in concrete
- d) The expansion of concrete due to heat

Which of the following factors contributes to the corrosion of steel reinforcement in concrete?

CO3

- a) Sulphate attack
- b) Chloride attack
- c) Alkali-aggregate reaction
- d) Thermal expansion

What is the main aim of concrete mix design?

CO2

- a) To reduce the cost of construction
- b) To achieve the desired strength and durability
- c) To increase the workability of concrete
- d) To reduce the water content

11. Which of the following types of concrete is specifically designed to have enhanced strength and durability under extreme conditions?

CO3

- a) High-Strength Concrete
- b) High-Performance Concrete
- c) Lightweight Concrete
- d) Fiber-Reinforced Concrete

The primary cause of Alkali-Aggregate Reaction (AAR) in concrete is:

CO1

- a) Reaction between free moisture and cement
- b) Chemical reaction between alkali hydroxides in cement and reactive silica in aggregates
- c) Corrosion of steel reinforcement

d) Extensive use of admixtures in concrete.

Q.3 Solve the following.

- Explain the manufacturing process of cement.
- Discuss the phenomenon of bulking of sand.

Q.4 Solve the following.

- Write a note on batching operation involved in concreting work.
- Define Workability. Explain what is meant in detail.

Q.5 Solve Any Two of the following.

- Define: a) Segregation b) Bleeding c) setting time d) Standard Consistency e) Hydration of Cement f) Bond Strength
- Illustrate difference between tilting type and non-tilting type mixer. Define admixture. State its types.

Q.6 Solve Any Two of the following.

- Write difference between High-Strength and High-Performance Concrete.
- Define Creep. Explain factors affecting Creep with its preventive measure.
- Write a note on Sulphate Attack and chloride attack on concrete.

Q.7 Solve Any Two of the following.

- Define concrete mix design. State its objectives and write methods of concrete mix design.
- Explain the methods of non-destructive testing (NDT) for concrete.
- Design a concrete mix for M45 grade using following data:
 - Grade designation: M45
 - Type of cement: OPC 43 Grade (Specific Gravity=1.15)
 - MSA: 20mm (Specific Gravity=2.80)
 - Minimum cement content: 320 kg/m³
 - Maximum water-cement ratio: 0.45

- f) Workability: 125 mm slump
 g) Exposure condition: Severe (RCC)
 h) Method of concrete placing: Pumping
 i) Volume of C.A. (20 mm) & for F.A. Zone II = 0.62 (W/C = 0.50)
 j) Type of Aggregate: Crushed Angular Aggregates
 k) Super Plasticizer will be used. Test on aggregates: Conforming to Zone II (Specific Gravity = 2.70)

Table 1 Assumed Standard Deviation
 (Clause 1.4.2 and Table 1.4.2)

Grade of Concrete	Assumed standard deviation
M 20	4
M 25	5
M 30	6
M 35	7
M 40	8
M 45	9
M 50	10

Table 2 Maximum Water Content per Cubic Metre of Concrete for Nominal Maximum Size of Aggregate
 (Clauses 4.2, A-5 and B-5)

Grade of concrete	Nominal Maximum Size of Aggregate	Maximum Water Content ¹⁾
	mm	kg
M 20 to M 40	10	208
	20	186
	40	165

NOTE — These quantities of mixing water are for use in computing maximum water/cement ratios for trial batches.

DR. KARANAGHER AMBESKAR TECHNOLOGICAL UNIVERSITY, LONERE

Regular/Supplementary Winter Examination - 2014

Course: B. Tech

Branch: Civil Engineering

Semester: V

Subject Code & Name: RTHM205, Project Management

Max Marks: 80

Date: 22/02/2023

Duration: 3 Hr.

Instructions to the Students:

1. Each question carries 12 marks.
2. Question No. 1 will be compulsory and includes objective type questions.
3. Candidates are required to attempt any four questions from Question No. 2 to Question No. 5.
4. The level of question/expected answer as per COs in the Course Outcome (CO) in which the question is based is mentioned in (c) in front of the question.
5. The of non-programmable scientific calculator is allowed.
6. Assume suitable data wherever necessary and mention it clearly.

		Level (CO)	Marks
Q.1	Objective type questions. (Compulsory Questions)		12
1	Completion of an activity on CPM network diagram, is generally known as a. Event b. Node c. Connector d. All of the above		1
2	If the values of t_o , t_p of an activity are 4 and 13, what is the variance of the activity? a. 3.92 b. 3.22 c. 14.36 d. 1.81		1
3	The estimated time required to perform an activity is known as a. Event b. Duration c. Duration d. Float		1
4	The t_o , t_p & t_f for an activity are 4, 11, and 12 days resp. The T_s of activity is a. 8 days b. 10 days c. 10 days d. 11 days		1
5	Critical Path a. Is always longest b. May be longest c. May be shortest		1
6	What does the direct cost of project include? a. Labour cost b. Equipment c. All the above		1
7	Which of the following is correct response in calculating event time in CPM? a. $EST - EFT - LFT - LFT$ b. $LFT - LFT - EFT - EFT$ c. $EST - EFT - LFT - LFT$ d. $EST - EFT - LFT - LFT$		1
8	Which of the following is a lagged Material? a. Sand b. Brick c. Brick d. Aggregate		1
9	CPM is used a. When duration for activities is known b. in finding stage c. When the duration for activities is unknown d. for cost estimate		1

10	When the float of the activity is negative, that activity is called as.....				CO2
	a. Critical Activity	CO2	c. Super Critical Activity	d. Subcritical Activity	
11	Bar charts are suitable for....				CO2
	a. Minor Works	CO2	c. Large Projects	d. All of the above	
12	Critical path method				
	a. Is an improvement upon bar chart method	b. Provides a realistic approach daily problems	c. Avoids delays which are very common in bar charts	d. All the above	
Q. 2 Solve the following.					
A) Explain phrases in project management.					
B) Differentiate between CPM and PERT					
Q. 3 Solve the following.					
A) What is the necessity and data required for updating the network?					
B) Crash the network given above and find Project Duration (Days) and Project Cost.					
	Activity	Normal Time	Crash Time	Normal Cost	Crash Cost
	1 - 2	3	1	5000	10000
	1 - 3	2	1	1500	3000
	2 - 4	3	2	2000	3000
	2 - 5	7	3	5000	8000
	3 - 5	6	2	8000	10000
	4 - 6	8	4	7000	9000
	5 - 6	9	5	15000	18000
Q. 4 Solve Any Two of the following.					
A) Explain briefly Direct cost and indirect cost for construction project.					
B) Draw the network and Determine the Project Duration.					
	Activity	Optimistic Time	Most likely time	Pessimistic time	
	1 - 2	6	10	20	
	1 - 3	7	10	13	
	2 - 4	8	15	21	

		2-3	1	11	11						
		3-5	3	7	21						
		4-6	6	12	11						
		5-6	1	6	11						
	Find the J Value if the Project mentioned above has to be completed in 22 days.										
C)	Discuss critical path theory in detail.							a			
Q.5	Solve Any Two of the following.							b			
A)	Explain Demand and Supply curve, Inflation and Cash flow diagram.							a			
B)	List the different types of interest. Explain any two.							a			
C)	Draw the network and calculate TE & TL for all activities for the following.							a			
	Activity (i-j)	1-2	2-3	2-4	3-5	3-6	4-5	4-7	5-8	6-8	7-8
	Duration	3	2	6	4	2	3	7	8	2	
Q.6	Solve Any Two of the following.							b			
A)	The Fixed Cost associated with a product is Rs. 30 Lakhs, the variable cost is Rs. 25, and the revenue from each item is Rs. 30. Calculate the Break-even quantity if the targeted profit is Rs. 10 Lakhs.							a			
B)	Explain the uses of computer software (Microsoft Project and Primavera) in project management.							a			
C)	Explain ISO 14000 in detail.							a			

Course: B. Tech

Branch: Civil Engineering

Semester: V

Subject Code & Name: BTCVC305_ T18 Transportation Engineering

Max Marks: 80

Date: 22/02/2025

Duration: 3h

Instructions to the Students:

1. Each question carries 12 marks.
2. Question No. 1 will be compulsory and include objective type questions.
3. Candidates are required to attempt any four questions from Question No. 2 to Question No. 6.
4. The level of questions/expected answer as per COE or the Course Outcome (CO) on which question is based is mentioned in () in front of the question.
5. Use of non-programmable scientific calculator is allowed.
6. Assume suitable data wherever necessary and mention it clearly.

Q. 1 Objective type questions. (Compulsory Question)

1. What is the primary goal of Highway Engineering?

- a) To ensure maximum traffic speed
- b) To design roads for minimal cost
- c) To provide safe, efficient, and durable roads
- d) To create aesthetic road designs

2. Which of the following is NOT part of Road Classification?

- a) Expressways b) National Highways
- c) Local Roads d) Drainage Systems

3. What is the main purpose of the Sight Distance in geometric design?

- a) To determine the width of the road
- b) To ensure drivers have enough time to react to obstacles
- c) To calculate the cost of construction
- d) To decide the number of lanes required

4. Which element is crucial for the construction of pavements?

- a) Soil properties b) Road design
- c) Type of traffic signals d) Number of intersections

5. Which of the following is NOT a property tested for aggregates in road construction?

- a) Hardness b) Toughness c) Transparency d) Specific gravity

6. What is the Marshall Stability Test used to design?

- a) Rigid pavements b) Bituminous paving mixes
c) Road markings d) Drainage systems
7. Which of the following factors is considered in traffic operations? CO-2
a) Vehicle volume counts b) Road aesthetics
c) Alignment of the road d) Soil compaction
8. What is the key focus of Intelligent Transport Systems (ITS)? CO-2
a) To design aesthetically pleasing roads
b) To reduce traffic accidents using advanced technologies
c) To improve the quality of bituminous pavements
d) To ensure proper drainage on roads
9. Which IRC code is used for the design of flexible pavements? CO-2
a) IRC: 58-2011 b) IRC: 37-2012 c) IRC: 104-2014 d) IRC: 61-2015
10. Which of the following modes of transportation has the least environmental impact? CO-2
a) Railways b) Roadways c) Airways d) Waterway
11. What is a primary cause of pedestrian accidents? CO-2
a) Poor road conditions b) Vehicle overspeeding
c) Lack of pedestrian crossings or signals d) Improper lane markings
12. Which of the following is an example of a semi-crash barrier designed for road safety? CO-2
a) Reflective road paint b) Guardrails
c) Speed humps d) Pedestrian signals

Q.2 Solve the following.

- A. Explain classification of road based on materials with diagram. CO-1
- B. Illustrate importance of various modes of transportation. CO-1
- C. Solve the following.
- D. Write a short note on Road Arboriculture. CO-1
- E. Define: a) Right of way b) Road Margin c) Carriage way
d) Shoulder e) Kerb f) Camber CO-1

Q. 4 Solve Any Two of the following.

- Define: a) Asphalt b) Road oil c) Tar d) Bitumen e) Cutback f) Asphalt
- Explain Marshall stability test
- State different types of tests carried in the laboratory on the sample of aggregate to decide the suitability for its use in road construction and explain any one of them in detail

CO-1

CO-1

CO-2

Q. 5 Solve Any Two of the following.

- What is Road Sign? Draw any twelve symbols of road sign.

CO-2

- Define: a) National Highway b) State Highway c) District Road d) Village Road e) Mandatory sign f) Informative sign

CO-2

- The speed of overtaking and overtaken vehicles is 70 & 40 kmph respectively on two-way traffic road. If the acceleration of overtaking vehicle is 0.35 m/s^2 . (i) Calculate safe overtaking sight distance. (ii) Mention the minimum length overtaking zone (Assume $t = 2$ seconds)

CO-3

Q. 6 Solve Any Two of the following.

- Explain the advantages and limitations of soft method of design.
- Write a short note on Railways, Airways, Waterways, Pipeline Transportation.
- Explain Intelligent Transport Systems (ITS).

CO-3

CO-3

CO-3

CO-2

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CO-2

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CO-3

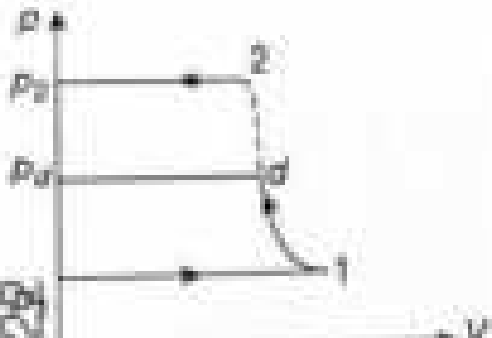
CO-3

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Instructions to the Students:

1. Each question carries 12 marks.
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3. Candidates are required to attempt any four questions from Question No. 2 to Question No. 6.
4. The level of questions expected answer as per COs in the Course Outcome (CO) in which the question is based is mentioned in () in front of the question.
5. Use of non-programmable scientific calculators is allowed.
6. Assume suitable data wherever necessary and mention it clearly.

		(Level/ CO)	Marks
Q. 1	Objective type questions. (Compulsory Question)		12
1	Mass of oxygen required to convert 1 kg of carbon to CO_2 will be (a) 11 kg (b) 11/3 kg (c) 8 kg (d) 8/3 kg	CO1	1
2	Oxy-acetylene is used to determine in flue gases, the percentage of (a) CO_2 , CO , and O_2 (b) CO_2 , CO , O_2 and N_2 (c) CO_2 (d) CO	CO2	1
3	Consider the following: 1. Safety valve 2. Steam trap 3. Steam separator 4. Economizer. Among these, the boiler accessories would include: (a) 1, 2, and 3 (b) 2, 3, and 4 (c) 1 and 4 (d) 1, 2, 3, and 4	CO3	1
4	The draught produced by the chimney is called (a) Natural (b) Induced (c) Forced (d) Balanced	CO1	1
5	The draught in locomotive is produced by (a) Forced fan (b) Induced fan (c) Steam jet (d) Chimney	CO2	1
6	Consider the following statements: The reheat cycle helps to reduce I. fuel consumption, II. steam flow, III. the condenser size. Which of these statements are correct? (a) I and II (b) I and III (c) II and III (d) I, II, and III	CO2	1
7	The function of the surface condenser is to (a) lower the engine thermal efficiency (b) increase the engine thermal efficiency (c) increase the back pressure of the engine (d) cool the exhaust gases	CO3	1
8	A single-stage impulse turbine with a diameter of 120 cm runs at 300 rpm. If the blade speed ratio is 0.42, then, the inlet velocity of steam will be	CO4	1

	(a) 79 m/s	(b) 188 m/s	(c) 450 m/s	(d) 900 m/s	
9	What is the cause of reheat factor in a steam turbine?				(C)
	(a) Reheating	(b) Superheating	(c) Supercorrelation	(d) Blade friction	
10	In a simple impulse turbine, the nozzle angle at the entrance is 30° . What will be the blade-speed ratio for maximum diagram efficiency?				(C)
	(a) 0.433	(b) 0.25	(c) 0.5	(d) 0.75	
11	Which one of the following statements is correct? In reciprocating compressors, one should aim at compressing the air				(D)
	(a) adiabatically	(b) isentropically	(c) isothermally	(d) polytropically	
12	The p - v diagram shown in below Figure is for				(C)
					
	(a) Roots blower	(b) Vanes blower	(c) Centrifugal compressor	(d) axial compressor	
Q. 2	Solve the following.				
A)	Develop the equation for the measurement of calorific value of solid fuel by the use of bomb calorimeter with neat sketch.				(C)
B)	How do you classify the fuels? Develop the combustion equation of hydrogen on mass basis.				(C)
Q. 3	Solve the following.				
A)	A boiler produces 4000 kg of dry and saturated steam in 6 hours. In the same time the mass of coal consumed is 300 kg of coal. The mean pressure of steam generated is 11 bar. The temperature of the feed water is 35°C . Determine the boiler efficiency if the calorific value of the fuel is 30000 kJ/kg.				(10)
B)	Classify the boiler mountings with their functions.				(C)
Q. 4	Solve Any Two of the following.				
A)	Derive the equation for thermal efficiency of Otto cycle with neat sketch.				(C)
B)	Explain the superheated flow through the nozzle with schematic diagram.				(C)
C)	A reheat cycle operating between 30 bar and 0.04 bar has a superheat and reheat temperature of 450°C . The first expansion takes place till the steam is dry saturated and then reheat is given. Determine the ideal cycle efficiency neglecting feed pump work.				(C)

Q.5	Solve Any Two of the following.		12
A)	Explain the reheat factor for steam turbine with suitable schematic diagram.	CO4	6
B)	Explain the different elements of condensing plant with suitable schematic diagram.	CO4	6
C)	Steam at 4.9 bar and 144°C is supplied to a single stage impulse turbine at the rate of 60 kg/min. From there, it is exhausted to a condenser at a pressure of 0.196 bar. The blade speed is 300 m/s. The nozzles are inclined at 25° to the plane of the wheel and outlet blade angle is 15°. Neglect friction losses and estimate (a) the theoretical power developed by the turbine, (b) the diagram efficiency, and (c) the stage efficiency.	CO4	6
Q.6	Solve Any Two of the following.		12
A)	Explain reciprocating air compressor with neat sketch.	CO5	6
B)	Explain the benefits of the multi staging in reciprocating air compressor with PV diagram.	CO5	6
C)	Derive the equation for indicated work of single stage, single acting reciprocating air compressor with neat sketch.	CO5	6
*** End ***			

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DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Regular/Supplementary Winter Examination – 2024

Course: B.Tech Branch: Mechanical Engineering and Allied

Subject Code & Name: (BTMC303) Heat Transfer

Semester: V

Marks: 60

Date: 06/12/2025

Duration: 3 Hr.

Instructions to the Students:

1. Each question carries 12 marks.
2. Question No. 1 will be compulsory and include objective type questions.
3. Candidates are required to attempt any four questions from Question No. 2 to Question No. 6.
4. The level of question/expected answer as per COE or the Course Outcome (CO) on which the question is based is mentioned in () in front of the question.
5. Use of non-programmable scientific calculators is allowed.
6. Assume suitable data whenever necessary and mention it clearly.

		Level (CO)	Marks
Q. 1	Objective type questions. (Compulsory Question)		12
	Which of the following is true about Fourier's law of heat conduction?		1
a. It describes the rate of heat flow through a material.	b. It is only applicable to fluids.	c. It is used only for non-steady state conditions.	d. It applies to heat transfer by convection.
		CO1	
	In which of the following situations would heat conduction not occur?	CO1	1
a. Between two solid bodies placed in cold water	b. Between a solid and a liquid placed in hot water.	c. Between two different phases of matter.	d. Between two liquids in a vacuum.
		CO1	
	Which factor determines the effectiveness of insulation?	CO2	1
a. Temperature difference	b. Material thickness.	c. Thermal conductivity.	d. All of the above
		CO2	
	In lumped heat transfer analysis, the temperature of an object changes with time according to:	CO3	1
a. Newton's Law of Cooling.	b. Fourier's Law	c. Stefan-Boltzmann Law.	d. Carnot's Law.
		CO3	
	In the case of a fin, the temperature distribution along its length is:	CO3	1
a. Linear	b. Exponential	c. Parabolic	d. Constant

6	In a finned surface, the heat transfer rate increases with:				CO1
	a. Increasing the thickness of the fin.	b. Decreasing the surface area.	c. Increasing the convective heat transfer coefficient.	d. Decreasing the length of the fin.	
	For a fin with a high thermal conductivity, the fin efficiency is generally:				CO1
	a. Low	b. High	c. Zero	d. Variable	
7	Which number characterizes the flow regime in boundary layers?				CO4
	a. Prandtl number	b. Reynolds number	c. Nusselt number	d. Froude number	
8	In a heat exchanger, NTU stands for:				CO3
	a. Net Transfer Units	b. Number of Transfer Units	c. New Thermal Units	d. None of the above	
9	A heat exchanger operates in parallel flow mode, and the temperature difference between the fluids is given by the logarithmic mean temperature difference (LMTD). If the fluids experience significant temperature change across the heat exchanger, how can the effectiveness of the heat exchanger be improved?				CO1
	a. By reducing the flow velocity of one of the fluids.	b. By increasing the flow rate of the hotter fluid.	c. By using a counter flow heat exchanger.	d. By decreasing the temperature difference between the two fluids.	
10	The Stefan-Boltzmann Law states that the radiative heat flux from a black body is proportional to:				CO6
	a. T^1	b. T^2	c. T^3	d. T^4	
11	The emissivity (ϵ) of a surface ranges between:				CO6
	a. 0 and 1	b. 0 and ∞	c. 0 and 1	d. 0 and 100	
12	Solve the following:				CO1
	Derive an equation for heat transfer rate through a hollow cylinder by applying Fourier's Law of Heat Conduction. The hollow cylinder has a length, L , inner radius as ' r_i ' and outer radius as ' r_o ', inner and outer wall temperatures as T_i and T_o . Thermal conductivity is represented as ' k '.				

B)	The inner surface of furnace wall is at 500 °C and outer surface is at 40 °C. Calculate the heat loss per m ² area of the wall, if the thermal conductivity of the brick is 2.5 W/m °C and wall thickness is 250 mm.	CO1	8
Q.3	Solve the following.		12
062171978	Write a short note on critical radius of insulation. Derive an equation for the critical radius of insulation for a cylinder.	CO2	8
062171978	An egg with a mean diameter of 80 mm is taken from a refrigerator at 5°C and heated in a pot using boiling water at atmospheric pressure. What will be the temperature of egg after 5 minutes? Use the following properties of egg: Density = 1000 kg/m ³ , Specific heat = 2 kJ/kg.K, thermal conductivity = 10 W/m.K, Convective heat transfer coefficient = 40W/m ² K. Check the validity of lumped heat capacity approach.	CO2	8
Q.4	Solve Any Two of the following.		12
062171978	Explain the concept of hydrodynamic and thermal boundary layers with reference to flow over a flat heated plate. Sketch laminar and turbulent boundary layers for flow over a flat plate. Also, show velocity profiles in the two regions: a) at the entrance to the laminar region. Assume uniform velocity profile on the upstream side of the plate.	CO3	8
B)	Explain the Role of the Nusselt Number in Forced Convection and How it is Related to the Heat Transfer Coefficient.	CO4	8
C)	What is the Effect of Surface Roughness on Heat Transfer in Forced Convection?	CO4	8
Q.5	Solve Any Two of the following.		12
062171978	In a double-pipe counter flow heat exchanger, oil flowing at 125 kg/min with a specific heat of 4200 J/kg.K is cooled from 90°C to 40°C by 140 kg/min of cooling water initially at 25°C. The overall heat transfer coefficient is given as 200 W/m ² .K, and the specific heat of the water is 6200 J/kg.K. Determine the following: 1. The Logarithmic Mean Temperature Difference (LMTD). 2. The required surface area of the heat exchanger.	CO5	8

Q. 3	Explain the following terms: (i) Heat Exchanger Effectiveness (ii) NTU (Number of Transfer Units) (iii) Fouling Factor of a Heat Exchanger (iv) Overall Heat Transfer Coefficient	COS	4
Q. 4	Explain & Sketch basic temperature distribution diagrams (temperature variation along the length) for following heat exchanger configurations: a) Parallel Flow Heat Exchanger b) Counter flow Heat Exchanger	COS	4
Q. 5	Solve Any Two of the following.		12
A)	Explain the Concept of Radiation Heat Transfer. How Does it Differ from Conduction and Convection?	COS	4
B)	Explain the Concept of Radiation Shielding. How Can it Be Used to Minimize Heat Transfer in High Temperature Applications?	COS	4
C)	State and Explain Planck's Law of Radiation. How Does it Relate to the Spectral Distribution of Radiation Emitted by a Body?	COS	4

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Regular/Supplementary Winter Examination - 2024

Course: B.Tech

Branch : Mechanical Engg/Mechanical Engg(Sandwich) And Allied

Subject Code & Name: BTMAC502 Machine Design I

Semester : V

Max Marks: 60

Date: /03/2025

Duration: 2

Instructions to the Students:

1. Each question carries 12 marks.
2. Question No. 1 will be compulsory and includes objective-type questions.
3. Candidates are required to attempt any four questions from Question No. 2 to Question No. 6.
4. The level of question/expected answer as per COE or the Course Outcome (CO) on which the question is based is mentioned in () or beside the question.
5. Use of non-programmable scientific calculators is allowed.
6. Assume suitable data whenever necessary and mention it clearly.

		Level/ CO	Marks
Q. 1	Objective type questions. (Compulsory Question)		12
Q. 2	Which of the following is not a traditional design method?	CO1	1
	a. Reverse Engineering b. Brainstorming c. Top and end prototyping d. Rapid prototyping		
Q. 3	Poor ergonomic design may lead to	CO1	1
	a. Attractive design b. User discomfort c. User satisfaction d. Weak design		
Q. 4	Cotter joints are commonly used for	CO2	1
	a. Connecting rods under axial loading b. Rotating shaft c. Gears d. Coupling		
Q. 5	Factor of safety in static loading condition is calculated as	CO4	1
	a. Maximum stress by permissible stress b. Permissible stress by maximum stress c. Stress by strain d. Strain by stress		
Q. 6	The stresses induced in the cotter of the cotter joint are	CO3	1
	a. Tensile stresses b. Crushing stresses c. Shear and bending stress d. Torsional stresses		
Q. 7	Torsional rigidity of a shaft refers to its ability of		1

	a. Resisting bending forces	b. Resisting compressive forces	c. Resisting twisting moments	d. Resisting tensile forces		
7	The key fits in the keyway of the				CO4	-
	a. Shaft only	b. Hub only	c. Both shaft and hub	d. None of the above		
8	Use of multiple notches in a V shaped flat plate will				CO1	-
	a. Reduce the stress concentration	b. Increase the stress concentration	c. No effect on stress concentration	d. None of the above		
9	Which of the following line is the safest in machine design?				CO3	-
	a. Goodman line	b. Soderberg line	c. Gerber parabola	d. Lagrange line		
10	If a spring has plain ends then number of inactive coils is?					-
	a. 1	b. 2	c. 3	d. 0		
11	Maximum efficiency of a square threaded is given by				CO4	-
	a. $1 - \sin \phi / 1 + \sin \phi$	b. $1 + \sin \phi / 1 - \sin \phi$	c. $2 - \sin \phi / 1 + \sin \phi$	d. $1 - \sin \phi / 2 + \sin \phi$		
12	What is the minimum specified length of fillet weld?				CO6	-
	a. Two times the size of weld	b. Four times the size of weld	c. Six times the size of weld	d. Half the size of weld		

Q. 2 Solve the following.

1. Explain the importance of standardization with suitable examples. CO1
2. Write general design procedure to design machine element. CO1

Q. 3 Solve the following.

A Knuckle joint is used to connect two rods which are required to withstand a tensile force of 100kN. The rods and pin are made of plain carbon steel 30C8 ($S_{yt} = 450 \text{ N/mm}^2$) and the factor of safety is 5. Assume - Thickness of fork end = 0.75 times dia. of rod & Thickness of single eye end = 1.25 times dia. of rod. Calculate:

1. Diameter of rods

2 diameter of pin considering shear & bending failure.

- b) Write design procedure to design a socket and taper roller joint.

CO3

16

Q.4 Solve Any Two of the following.

12

- a) What are various causes of stress concentration? Discuss the different methods of reducing the effect of stress concentration.

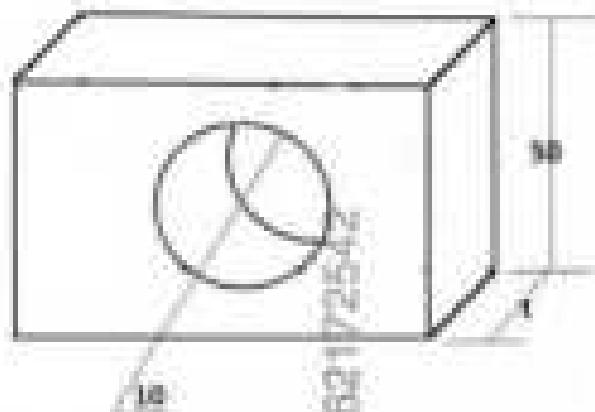
CO5

16

A plate made of steel 20C8 ($S_u = 400 \text{ N/mm}^2$) is hot rolled & normalized condition is shown in figure. It is subjected to completely reversed load of 30KN. The notch sensitivity factor 'q' is 0.8 and expected reliability is 90%. The factor of safety is 2. The size factor is taken as 0.85. The surface finish factor is 0.67. Determine the thickness of the plate.

CO5

16



A rotating beam of specimen made of steel 45C8 ($S_u = 450 \text{ N/mm}^2$) is subjected to a completely reversed bending stress. Calculate the endurance strength of the specimen for a life of 50000 cycles.

CO5

16

Q.5 Solve Any Two of the following.

12

- a) Explain the ASME code in design of shaft.

CO6

16

- b) With neat sketch explain different types of keys used in engineering.

CO6

16

Design a muff or sleeve coupling to connect two steel shafts transmitting 25 kW power at 350 rpm. The shaft and keys are made of plain carbon steel 45C8 ($S_u/S_y = 450 \text{ N/mm}^2$). The muff or sleeve is made of grey cast iron FG200 ($S_u = 200 \text{ N/mm}^2$). The factor of safety for the shaft and key is 4. For muff or sleeve the factor of safety is 6 based on ultimate strength.

CO6

16

Q. 6 Solve Any Two of the following.

- A) A compression helical spring is to be designed for an operating load range of 90 to 135 N, deflection of the spring for this load range is 7.5mm, assume a spring index of 10, permissible shear stress of 480 MPa and modulus of rigidity of 80 KN/mm². Design the spring considering the Wahl stress concentration factor.

Explain the Forms of threads used for power screw with its specific applications.

A plate 75 mm wide and 10 mm thick is joined by means of single transverse and double fillet welds as shown in figure. The joint is subjected to maximum tensile load of 55KN. The permissible tensile and shear stress in the weld material are 70 and 50 N/mm² respectively. Determine the required length of each parallel fillet weld.



*** End ***

Instructions to the Students:

- Each question carries 12 marks.
- Question No. 1 will be compulsory and include objective-type questions.
- Questions are required to attempt any four questions from Question No. 2 to Question No. 6.
- The level of questions expected answer as per OBE or CO (General Outcome CO2) at which the question is based is mentioned in () in front of the question.
- Use of non-programmable scientific calculator is allowed.
- Answer neatly and write wherever necessary and mark clearly.

					Level/CO	Marks
Q.1	Objective type questions- (Compulsory Question)				(1 x 12)	12
1.	The fuel mostly used in boilers is _____				BL3/CO1	1
	a) Bitum Coal	b) Peat	c) Caking bituminous coal	d) Non caking bituminous coal		
2.	Which of the following has minimum molecular mass _____					
	a) Oxygen	b) Nitrogen	c) Hydrogen	d) Water		
3.	Which of the following has a water tube type boiler _____				BL3/CO1	1
	a) Lancashire boiler	b) Babcock & Wilcox boiler	c) Locomotive boiler	d) Cochran boiler		
4.	In a boiler, various heat losses take place. The biggest loss is due to _____					
	a) Radiation loss	b) Dry flue gases	c) Steam formation	d) Unburnt carbon		
5.	A cycle consisting of two constant volume & two isothermal processes known as _____				BL3/CO1	1
	a) Carnot cycle	b) Joule cycle	c) Stirling cycle	d) Rankine cycle		
6.	In Rankine cycle as compared to Carnot cycle has _____ work ratio.					
	a) High	b) Low	c) Medium	d) None of these		
7.	The steam leaves the nozzle at a _____				BL3/CO4	1
	a) high pressure low velocity	b) high pressure high velocity	c) low pressure low velocity	d) low pressure high velocity		
8.	The narrowest section in the nozzle is known as _____					
	a) Throat	b) Venturi	c) Convergent	d) Divergent		
9.	The study of steam is steam turbine is _____				BL3/CO5	1
	a) Static	b) Dynamic	c) Static & Dynamic	d) Neither static nor dynamic		
10.	A Condenser in a steam power plant _____					
	a) increases expansion ratio of steam	b) Reduces back pressure of exhaust steam	c) Reduces temperature of exhaust steam	d) All of these		

11	The volume of air delivered by compressor is called _____				R11/10/19
	a) Free air delivery	b) Compressor capacity	c) Swept volume	d) None of these	
12	The type of rotary compressor used in gas turbine is of _____				R12/10/19
	a) Axial flow type	b) Centrifugal type	c) Radial flow type	d) None of these	
Q. 2	Solve the following.				
A)	Define the term fuel. Classify fuels in details.				
B)	Explain how flue gas analysis is done by using Orsat apparatus with neat sketch.				
Q. 3	Solve the following.				
A)	Define pumping & accessories. Explain any one with schematic diagram.				
B)	Differentiate between water tube & fire tube type boilers.				
Q. 4	Solve Any Two of the following.				
A)	Explain Reheat Rankine cycle with schematic diagram & represent it on T-S diagram.				
B)	Represent P-V & T-S diagrams of Joule - Brayton Cycle & explain processes involved in it.				
C)	Dry air at a temperature of 27°C & pressure of 30bar enters a nozzle & leaves at a pressure of 4bar. Find the mass of air discharged, if area of nozzle is 200mm ² .				
Q. 5	Solve Any Two of the following.				
A)	With h-s graph explain effect of friction between nozzle surface & steam.				
B)	Explain the term compounding of steam turbine. Also sketch if pressure compounding & Labelled.				
C)	What are the sources of air leakage in steam condensers? How to eliminate air leakage in condensers?				
Q. 6	Solve Any Two of the following.				
A)	In a DeLaval turbine steam issue from the nozzle with a velocity of 1200 m/s. The nozzle angle is 20° the mean blade velocity is 400 m/s & inlet & outlet angles of blades are equal. The mass of steam flowing through the turbine / hr is 1000kg. Calculate : i) Relative velocity of steam entering the blades ii) Tangential force on blades. iii) Power developed. iv) Blade efficiency.				
B)	With a neat sketch explain single stage reciprocating air compressor with applications.				
C)	With a neat sketch explain working of centrifugal compressor.				
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DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONER

Supplementary Winter Examination – 2024

Course: B.Tech

Branch: Mechanical Engineering/Mechanical Semester V

Subject Code & Name: BTHMCC03_V01 Machine Design – I

Engineering Technology

Max Marks: 60

Date: 12/02/2025



Instructions to the Students:

1. Each question carries 12 marks.
2. Question No. 1 will be compulsory and include objective type questions.
3. Candidates are required to attempt any four questions from Question No. 2 to Question No. 5.
4. The level of questions/expected answer is per COE or the Course Outcome (CO) in which question is found is mentioned in () in front of the question.
5. Use of non-programmable scientific calculators is allowed.
6. Assume suitable data wherever necessary and mention it clearly.

		Level CO	Marks
Q. 1	Objective type questions. (Compulsory Question)		12
1.	Which of the following is not the method to reduce stress concentration? a. Usage of sharp corners b. Usage of additional discontinuities c. Usage of fillet radii d. Usage of additional notches and holes	CO3	1
2.	In machine design, which of the following joins two rotating shafts to each other? a. Key b. Coupling c. Gear d. Belt drive	CO1	1
3.	ISO 14000 standards are for the a. Quality Management System b. Environmental Management System c. Administration d. Supply chain	CO1	1
4.	Which of the following is a disadvantage of welding? a. Lighter structures b. Inspection is easier c. Well rigid joint d. Greater strength	CO1	1
5.	Which thread is more suitable in power screw to take load in both directions? a. Acme Thread b. Square Thread c. Buttress Thread d. None of these	CO6	1
6.	Generally, the proportion for the width of the key is	CO6	1

	a. 0.5 D	b. 0.52D	c. 0.25 D	d. 0.1 D	CS
7	The most commonly used spring for truck, trailer and railway carriage is				CS
	a. Helical Spring	b. Extension Spring	c. Compression Spring	d. Leaf Spring	
8	A screw is said to be a self locking screw if its efficiency is				CS
	a. less than 50%	b. more than 50%	c. equal to 50%	d. equal to 100%	
9	The fatigue life of a part can be improved by				CS
	a. electroplating	b. shot peening	c. polishing	d. coating	
10	Ergonomics is related to human				CS
	a. comfort	b. safety	c. both a and b	d. none of the above	
11	Which property is not required for shaft material?				CS
	a. High shear and tensile strength	b. Good machinability	c. High fatigue strength	d. Good castability	
12	The maximum efficiency of square threaded power depends upon				CS
	a. friction angle	b. pitch of screw	c. lead angle of screw	d. nominal diameter of screw	
Q.2	Solve the following.				CS
A)	A plate made of steel 20C8 (Sut=440N/mm ²) in hot rolled and normalized condition is subjected to a completely reversed axial load of 30 kN. The notch sensitivity factor q can be taken as 0.8 and the expected reliability is 90%. The size factor is 0.85. The factor of safety is 2. Determine the plate thickness for infinite life.				CS
B)	Explain Ergonomic consideration in machine design.				CS
Q.3	Solve the following.				CS
A)	It is required to design a knuckle joint to connect two circular rods subjected to an axial tensile force of 50 kN. The rods are co-axial and a small amount of angular movement between their axes is permissible. Design the joint and				CS

	specify the dimensions of its components. Select suitable materials for the parts.		
B)	What is stress concentration? What are the causes of stress concentration & remedies for stress concentration?	CO3	8
Q. 4	Solve Any Two of the following.		12
A)	What are the advantages of welded joints compared with riveted joints?	CO3	8
B)	A steel plate, 100 mm wide and 10 mm thick, is welded to another steel plate by means of double parallel fillet welds. The plates are subjected to static tensile force of 50 kN. Determine the required length of the welds if the permissible shear stress in the welds is 54 N/mm ² .	CO4	8
C)	What is overhauling of power screw? What is the condition for overhauling?	CO2	8
Q. 5	Solve Any Two of the following.		12
A)	What is self-locking of power screw? What is the condition for self-locking?	CO1	8
B)	A double-threaded power screw, with 60 degree trapezoidal threads is to raise a load of 300 kN. The nominal diameter is 100 mm and the pitch is 12 mm. The coefficient of friction at the screw threads is 0.15. Neglecting collar friction, calculate i) Torque required to raise the load, ii) Torque required to lower the load, iii) Efficiency of the screw.	CO4	8
C)	Write design process of muff coupling with suitable sketches.	CO5	4
Q. 6	Solve Any Two of the following.		12
A)	Define i) Fatigue failure, ii) Endurance limit, iii) Notch sensitivity.	CO4	8
B)	A helical spring is made from a wire of 5 mm diameter and has outside diameter of 75 mm. If the permissible shear stress is 100 MPa and modulus of rigidity is 84 GPa/mm ² , find the axial load which the spring can carry and the deflection per active turn.	CO6	8
C)	Explain following terms of the spring i) Free length ii) Solid height iii) Spring rate iv) Spring index.	CO7	8
*** End ***			

Instructions to the Students:

Each question carries 12 marks.

Question No. 1 will be compulsory and contains objective type questions.

Candidates are required to attempt any four questions from Question No. 2 to Question No. 6.

The level of question/expected answer as per COE or the Course Outcome (CO) on which the

question is based is mentioned in () in front of the question.

1. Use of non-programmable scientific calculators is allowed.

2. Assume suitable data wherever necessary and mention it clearly.

		Level/CO	Marks
Q. 1	Objective type questions. (Compulsory Question)		12
1.	The velocity ratio of two pulleys connected by an open belt or crossed belt is	Understand / CO1	1
	a. directly proportional to their diameters b. inversely proportional to their diameters c. directly proportional to the square of their diameters d. inversely proportional to the square of their diameters		
	The velocity of the belt for maximum power is _____ where $m =$ Mass of the belt in kg per metre length.	Analysing / CO1	1
	a. $\sqrt{\frac{T}{3m}}$ b. $\sqrt{\frac{T}{4m}}$ c. $\sqrt{\frac{T}{5m}}$ d. $\sqrt{\frac{T}{6m}}$		
	The type of gears used to connect two non-parallel non-intersecting shafts are	Understand / CO2	1
	a. spur gears b. helical gears c. bevel gears d. none of these		
	The size of a gear is usually specified by	Understand / CO2	1
	a. pressure angle b. circular pitch c. diametral pitch d. pitch circle diameter		
2.	Which is the incorrect relationship of gears?	Analysing / CO2	1

	a. Circular pitch = Diametral pitch = π	b. Module = P.C.D./No. of teeth	c. Dedendum = 1.157 module	d. Addendum = 1.157 module	
9	The train value of a gear train is				Understand CO2
	a. equal to velocity ratio of a gear train	b. reciprocal of velocity ratio of a gear train	c. always greater than unity	d. always less than unity	
	The maximum fluctuation of energy is the				Understand CO3
	a. sum of maximum and minimum energies	b. difference between the maximum and minimum energies	c. ratio of the maximum energy and minimum energy	d. ratio of the mean resisting torque to the work done per cycle	
8	The maximum fluctuation of energy in a flywheel is equal to				Analyzing CO1
	a. $I(\omega_{\max} - \omega_{\min})$	b. $I \omega^2 / 2$	c. $2EI \omega$	d. all of these	
	A disc is spinning with an angular velocity ω rad/s about the axis of spin. The couple applied to the disc causing precession will be				Analyzing CO4
	a. $\frac{1}{2} I \omega^2$	b. $I \omega^2$	c. $I \omega \omega_p$	d. $I \omega \omega_p$	
10	The rotor of a ship rotates in clockwise direction when viewed from the stern and the ship takes a left turn. The effect of the gyroscopic couple acting on it will be				Understand CO4
	a. to raise the bow and stern	b. to lower the bow and stern	c. to raise the bow and lower the stern	d. to lower the bow and raise the stern	
	When there is a reduction in amplitude of every cycle of vibration, then the body is said to have				Understand CO5
	a. free vibration	b. forced vibration	c. damped vibration	d. all of these	
12	The factor which affects the critical speed of a shaft is				Understand CO5
	a. diameter of the disc	b. span of the shaft	c. eccentricity	d. all of these	

Q.1	Solve the following.		12
A)	Obtain an expression for the length of belt in a cross belt drive.	Analysing / CO1	6
B)	An engine, running at 150 r.p.m., drives a line shaft by means of a belt. The engine pulley is 750 mm diameter and the pulley on the line shaft being 450 mm. A 900 mm diameter pulley on the line shaft drives a 150 mm diameter pulley keyed to a dynamo shaft. Find the speed of the dynamo shaft, when 1. there is no slip, and 2. there is a slip of 2% at each drive.	Evaluating / CO1	8
Q.2	Solve the following.		12
A)	State and prove the law of gearing. Show that involute profile satisfies the conditions for correct gearing.	Analysing / CO2	6
B)	A pinion having 30 teeth drives a gear having 80 teeth. The profile of the gears is involute with 20° pressure angle, 12 mm module and 30 mm addendum. Find the length of path of contact, arc of contact and the contact ratio.	Evaluating / CO2	8
Q.3	Solve Any Two of the following.		12
A)	What do you understand by 'gear train'? Discuss the various types of gear trains.	Understanding / CO2	6
B)	Explain the terms 'Fluctuation of energy' and 'Fluctuation of speed' as applied to flywheels.	Analysing / CO3	6
C)	Two shafts A and B are co-axial. A gear C (50 teeth) is rigidly mounted on shaft A. A compound gear D-E gears with C and an internal gear F. D has 20 teeth and gears with C and E has 35 teeth and gears with an internal gear F. The gear F is fixed and is concentric with the shaft axis. The compound gear D-E is mounted on a pin which projects from an arm keyed to the shaft B. Sketch the arrangement and find the number of teeth on internal gear F assuming that all gears have the same module. If the shaft A rotates at 150 r.p.m., find the speed of shaft B.	Evaluating / CO2	8

Q.7	Solve the following.			11
A)	Obtain an expression for the length of belt in a cross belt drive.	Analysing / CO1		6
B)	An engine, running at 150 r.p.m., drives a line shaft by means of a belt. The engine pulley is 750 mm diameter and the pulley on the line shaft being 450 mm. A 900 mm diameter pulley on the line shaft drives a 130 mm diameter pulley keyed to a dynamo shaft. Find the speed of the dynamo shaft, when 1. there is no slip, and 2. there is a slip of 2% at each drive.	Evaluating / CO1		8
Q.8	Solve the following.			12
A)	State and prove the law of gearing. Show that involute profile satisfies the conditions for correct gearing.	Analysing / CO2		8
B)	A pinion having 30 teeth drives a gear having 80 teeth. The profile of the gears is involute with 20° pressure angle, 12 mm module and 10 mm addendum. Find the length of path of contact, arc of contact and the contact ratio.	Evaluating / CO2		8
Q.9	Solve Any Two of the following.			17
A)	What do you understand by 'gear train'? Discuss the various types of gear trains.	Understanding / CO1		8
B)	Explain the terms 'Fluctuation of energy' and 'Fluctuation of speed' as applied to flywheels.	Analysing / CO3		8
C)	Two shafts A and B are co-axial. A gear C (50 teeth) is rigidly mounted on shaft A. A compound gear D-E gears with C and an internal gear F. D has 20 teeth and gears with C and E has 35 teeth and gears with an internal gear F. The gear F is fixed and is concentric with the shaft axis. The compound gear D-E is mounted on a pin which projects from an arm keyed to the shaft B. Sketch the arrangement and find the number of teeth on internal gear F assuming that all gears have the same module. If the shaft A rotates at 110 r.p.m., find the speed of shaft B.	Evaluating / CO2		8

Q.5	Solve Any Two of the following.	
A)	A punching press is driven by a constant torque electric motor. The press is provided with a flywheel that rotates at maximum speed of 225 r.p.m. The radius of gyration of the flywheel is 0.5 m. The press punches 720 holes per hour; each punching operation takes 2 second and requires 15 kN-m of energy. Find the power of the motor and the minimum mass of the flywheel if speed of the same is not to fall below 200 r. p. m.	Evaluating/ CO3
	Describe the gyroscopic effect on an aeroplane.	Understanding/ CO4
C)	The heavy turbine rotor of a sea vessel rotates at 1500 r.p.m. clockwise looking from the stern, its mass being 750 kg. The vessel pitches with an angular velocity of 1 rad/s. Determine the gyroscopic couple transmitted to the hull when bow is rising, if the radius of gyration for the rotor is 250 mm. Also show in what direction the couple acts on the hull?	Evaluating/ CO4
Q.	Solve Any Two of the following.	
A)	Discuss briefly with neat sketches the longitudinal, transverse and torsional free vibrations.	Remember/ CO5
B)	Explain the term 'whirling speed' or 'critical speed' of a shaft. Prove that the whirling speed for a rotating shaft is the same as the frequency of natural transverse vibration.	Analysing/ CO5
C)	Explain the terms 'under damping, critical damping' and 'over damping'	Understanding/ CO5
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DR. SARABJIT ARORA TECHNOLOGICAL UNIVERSITY, LONER

Regular/Supplementary Winter Examination – 2024

Course: B.Tech

Branch: Mechanical / Mechanical Engineering Sandwich/ Mechanical And Automation Engg

Semester: V

Subject Code & Name: Refrigeration & Air Conditioning (RTMPES04A)

Max Marks: 80

Date: 13/02/2025

Duration: 1 hr

Instructions to the Students:

1. Each question carries 12 marks.
2. Question No. 1 will be compulsory and include objective-type questions.
3. Candidates are required to attempt any four questions from Question No. 2 to Question No. 6.
4. The level of question/expected answer as per CBE or the Course Outcome (CO) in which the question is based is mentioned in () in front of the question.
5. Use of non-programmable scientific calculators is allowed.
6. Assume suitable data wherever necessary and mention it clearly.

Q.1	Objective type questions. (Compulsory Question)				Level/CO	1
	The heat removing capacity of one tonne refrigerator is equal to					
	a. 21 kJ/min	b. 210 kJ/min	c. 4.2 kJ/min	d. 420 kJ/min	CO1 (L1)	1
	The highest temperature during the cycle in a vapour compression refrigeration system occurs after				CO2 (L2)	1
	a. compressor	b. condensation	c. expansion	d. evaporation		
Q.2	How is the condensation process in vapour compression refrigeration cycle carried out?				CO2 (L2)	1
	a. at constant volume	b. at constant pressure	c. at constant enthalpy	d. all of the above		
	Cooling effect is produced in the				CO2 (L2)	1
	a. Condenser	b. Expansion valve	c. Evaporator	d. None		
	Due to sub-cooling in vapour compression refrigeration, COP				CO2 (L2)	1
	a. Decreases	b. Increases	c. Remains same	d. None		
Q.3	Cascading refrigeration is applicable for				CO3 (L2)	1
	a. Cold storage	b. Condition air conditioning	c. Low temperature applications	d. None		

7	An evaporator is also known as _____				CO3 (L2)
	a. freezing coil	b. cooling coil	c. chilling coil	d. all of these	
8	Due to intercooling in multistage refrigeration, COP _____				CO3 (L1)
	a. Increases	b. Decreases	c. Remains same	d. None	
9	The trade name of Refrigerant CH ₄ is _____				CO1 (L2)
	a. R130	b. R40	c. R50	d. R60	
10	COP of vapour Absorption system is _____ than vapour compression system				CO3 (L2)
	a. higher	b. greater	c. Lower	d. don't know	
11	Temperature recorded by outdoor thermometer is called as _____				CO4 (L1)
	a. DBT	b. WBGT	c. DPT	d. None of the mentioned	
12	The amount of heat required to increase temperature by 1 degree is called as _____				CO4 (L1)
	a. latent heat	b. sensible heat	c. Specific heat	d. total heat	
Q.2 Solve the following.					
10	Explain Simple air refrigeration system by using a line diagram.				CO1 (L2)
11	Write trade names of following refrigerants i) CO ₂ ii) NH ₃ iii) C ₂ H ₆ iv) CH ₂ ClF ₂ v) CCl ₂ F ₂ vi) SO ₂				CO1 (L2)
Q.3 Solve the following.					
A)	Derive the expression for C.O.P. of Vapour Compression cycle by using T-S & P-h diagram.				CO3 (L1)
B)	Illustrate by using P-h chart, any one method used to improve performance of simple VCC				CO3 (L1)
Q.4 Solve Any Two of the following.					
A)	Illustrate the three fluid vapour absorption system using a neat sketch.				CO3 (L1)
B)	By using P-h, explain the Cascade refrigeration system.				CO3 (L1)
C)	Illustrate the simple vapour absorption system using a neat sketch.				CO3 (L1)

Q.3	Solve Any Two of the following.		12
A)	Define the terms i) Dry bulb temperature ii) Wet bulb temperature iii) Dew point temperature iv) Moist air v) dry air vi) saturated air	CO4 (L1)	6
	Write short notes on the split air conditioning system.	CO4 (L2)	6
	On a particular day, surrounding condition are DBT = 40 °C, WBT = 35 °C, Atmospheric Pressure = 75 mm of Hg. Calculate i) Dew point temperature ii) relative humidity iii) specific humidity iv) degree of saturation v) vapour density vi) enthalpy of mixture.	CO4 (L3)	6
Q.4	Solve Any Two of the following.		12
A)	An air conditioning plant is required to supply 60 m ³ of air per minute at a DBT of 25°C and 50% RH. The outside air is at a DBT of 32°C and 60% RH. Determine the mass of water drained and capacity of cooling coil. Assume the air conditioning plant first to dehumidify and then to cool the air.	CO4 (L3)	6
	Describe various methods of noise control in AC.	CO4 (L2)	6
	Illustrate Thermostatic expansion valve by using Neat sketch	CO4 (L3)	6
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DR. BARANATH ANANDIKAR TECHNOLOGICAL UNIVERSITY, LOSCHER

Regular/Supplementary Winter Examination - 2014

Course: B.Tech. Branch: Mechanical Engineering/Mechanical Engineering
Sandwich/Mechanical & Automation Engineering

Subject Code & Name: BTAPL5040 Automobile Engineering Semester: V

Max. Marks: 60

Date: 24/02/2015

Duration: 3 Hr

Instructions to the Students:

1. Each question carries 12 marks
2. Question No. 1 will be compulsory and include objective-type questions
3. Candidates are required to attempt any four questions from Question No. 2 to Question No. 6
4. The level of questions expected answer as per OBE or the Course Outcomes (CO) as which the question is based is mentioned in () in front of the question
5. Use of non-programmable scientific calculators is allowed
6. Assume suitable data wherever necessary and mention it clearly

		(Level/CO)	Mark
Q.1	Objective type questions. (Compulsory Question)		12
1	The basic automobile structure consists of the suspension system, axles, wheels and	CO1	12
	(a) steering (b) brakes (c) frame (d) lights		
	The purpose of gear box in an automobile is to	CO1	
	(a) vary speed (b) vary torque (c) provide permanent speed reduction (d) to disconnect the road wheels from the engine when desired		
2	The most effective section against bending is	CO2	12
	(a) rectangular bar (b) round hollow tube (c) round bar (d) square hollow section		
3	The rigid suspension is beneficial when it is desired to	CO1	12
	(a) Reduce the spring mass (b) improve tyre-to-ground contact characteristic (c) Have more flexibility in design (d) Have large suspension stroke to take care of large changes in load		
4	Hard steering is due to	CO1	12
	(a) Low tyre pressure (b) High speed of vehicle (c) Worn out bearing of front wheels (d) Stub axle bending		

6	Automobile gears are generally made of				CO1
	(a) Cast iron	(b) Mild steel	(c) Wrought iron	(d) Carbon chrome manganese steel	
7	The purpose of torque converter in automobile is				CO4
062175576	(a) Automatic multiplying engine torque	(b) Automatically multiplying engine speed	(c) Automatically control the speed of engine	(d) Automatically multiplying vehicle torque	
8	The hole or slot in the rim which accommodates the valve for tyre inflation is called-				CO4
	(a) Well	(b) Flange	(c) Valve aperture	(d) None of these	
9	In heavier vehicles, tubeless tyres cannot be used because				CO5
062175576	(a) Rims are flat based and they are airtight	(b) Rims are flat based and they are not airtight	(c) Rims are well shaped and airtightness is present	(d) Rims are well shaped but no airtightness is present	
10	Tandem master cylinder consists of				CO5
062175576	(a) One cylinder and one reservoir	(b) Two cylinders and one reservoir	(c) One cylinder and two reservoirs	(d) Two cylinders and two reservoirs	
11	Mechanical efficiency of an automobile engine usually varies in the range				CO6
	(a) 50-60%	(b) 60-70%	(c) 70-90%	(d) more than 90%	
12	The most accurate dynamometer is the				CO6
	(a) prony brake type	(b) hydraulic type	(c) swinging field type	(d) eddy current type	
13	Solve the following.				
14	What are the different loads acting on chassis and explain briefly?				CO1
15	Justify the need of a gear box with suitable sketch.				CO1
16	Solve the following.				
A)	Explain a typical power steering system.				CO2
B)	What are the objectives and components of suspension system?				CO2

Q.4	Solve Any Two of the following.		12
A)	Explain the purpose and working of differential axle.	CO3	4
B)	Explain the working principle of synchromesh gear box with neat sketch.	CO3	4
C)	Explain the working of overrun joint with neat sketch.	CO3	4
Q.5	Solve Any Two of the following.		12
A)	Explain the Pneumatic and Hydraulic Braking Systems in a Automobile with suitable schematic diagram.	CO4	6
B)	Define caster and camber with suitable schematic diagram.	CO4	6
C)	Define and explain the following front wheel alignment factors: • King-pin inclination • Toe-in • Toe-out	CO4	6
Q.6	Solve Any Two of the following.		12
A)	With a neat sketch, explain the construction of a lead acid battery.	CO6	4
B)	Explain the principle of operations, applications and working of starting Motor.	CO6	4
C)	Write in details about the engine test up methodologies.	CO6	4

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DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONER

Regular & Supplementary Winter Examination - 2024

Course: B.Tech. **Branch:** Mechanical Engineering / Mechanical Engineering Sandwich /
Automation & Robotics/Robotics/ Mechananics Engineering

Subject Code & Name: BTME03034

Renewable Energy Sources

Semester: V

Max.Marks: 60

Date: 23/02/2025

Duration: 3 Hrs

Instructions to the Students:

1. Each question carries 12 marks
2. Question No. 1 will be compulsory and include objective type questions.
3. Candidates are required to attempt any four questions from Question No. 2 to Question No. 6.
4. The level of question/expected answer as per CBC or the Course Outcome (CO) in which the question is based is mentioned in () in front of the question.
5. Use of non-programmable scientific calculators is allowed.
6. Assume suitable data whenever necessary and mention it clearly.

				Level(CO)	Marks
Q. 1.	Objective type questions. (Compulsory Question)				12
1.	Which of the following is a benefit of solar energy?				1
	a. Reduction in greenhouse gas emissions	b. Low maintenance costs	c. Energy independence	d. All of the above	1
2.	Which component of a solar panel converts sunlight into electricity?				1
	a. Inverter	b. Battery	c. Semiconductor material	d. Reflector	1
3.	In a solar collector, why is the transparent cover provided?				1
	a. Protect the collector from dust.	b. Reduce the heat losses from collector towards to atmosphere	c. Transmit solar radiation only	d. All of the above.	1
4.	An instrument used to measure total solar radiation is called				1
	a. Hygrometer	b. Pyranometer	c. anemometer	d. Pyrheliometer	1
5.	Which component of a solar panel converts sunlight into electricity?				1
	a. Inverter	b. Battery	c. Semiconductor material	d. Reflector	1
6.	Maximum efficiency is obtained in.				1

	a. Flat plate collector	b. Concentrated tube collector	c. Low focusing collector	d. Parabolic dish collector		
7	The wind speed is measured using an instrument called				1	1
	a. Anemometer	b. Manometer	c. anemometer	d. wind cone		
	A generator in commercial type wind turbines are provided with data from				1	1
	a. Accelerator	b. Yaw drive	c. Rotor	d. None		
	Which energy forms can biomass be converted to?				1	1
	a. Electrical and light	b. Light and chemical	c. Electrical and heat	d. Heat and light		
10	What is biomass?				1	1
	a. Organic materials from living organisms	b. Inorganic materials from living organisms	c. Inorganic materials from non-living organisms	d. Organic materials from non-living organisms		
	What does OTEC stand for?				1	1
	a) Ocean thermal energy cultivation	b) Ocean thermal energy conversion	c) Ocean techno energy conservation	d) Ocean thermal energy consumption		
12	How is OTEC caused?				1	1
	a. By wind energy	b. By geothermal energy	c. By solar energy	d. By gravitational force		
Q. 7	Solve the following.					12
A)	Explain the difference between renewable and non-renewable energy with suitable examples. Why is renewable energy important?				1	1
B)	Explain in detail energy reserves in India				1	1

Q.3	Solve the following.			12
A)	Explain with neat sketch construction and working of pyranometer.	2		6
B)	Define a) Declination angle b) Solar Azimuth angle c) Altitude angle.	2		6
Q.4	Solve Any Two of the following.			12
A)	Explain with neat sketch construction of flat plate collectors & list out its limitation.	2		6
B)	Explain construction and working of Photo Voltaic cell.	2		6
C)	Explain Solar drying system with advantages & disadvantage.	2		6
Q.5	Solve Any Two of the following.			12
A)	What is wind energy? Give classification of types of wind mills.	4		6
B)	Explain selection of site for wind turbine generation system.	4		6
C)	What is biomass energy? Explain with neat sketch floating drum type.	4		6
Q.6	Solve Any Two of the following.			12
A)	Write a short note on Geothermal energy & OTEC system.	2		6
B)	Explain Nuclear Reactor.	2		6
C)	What is OTEC system? Explain working of open cycle OTEC system.	2		6
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DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Regular & Supplementary Examination – Winter 2024

Course: B. Tech. **Branch:** Mechanical Engineering/ Mechanical Engg Sandwich & Allied

Subject Code & Name: BTM00505C Human Resources Management

Semester: V

Max. Marks: 60

Date: 21/02/2025

Duration: 3 hrs

Instructions to the Students:

1. Each question carries 12 marks.
2. Question No. 1 is compulsory and include objective-type questions.
3. Candidates are required to attempt any five questions from Question No. 2 to Question No. 6.
4. The level of question/expected answer is **ADDRE** or the Course Outcome (CO) on which the question is based is mentioned in () in front of the question.
5. Use of non-programmable scientific calculators is allowed.
6. Assume suitable data wherever necessary and mention it clearly.

	(Level/CO)	Marks
Q. 1 Objective type questions. (Compulsory Questions)		12
1. Which of the following influences human resources management? a. Government regulations, b. Government policies, c. labor laws d. All of these	CO1	1
Planning is a process by which _____ a. manager select, train, promote their staff b. a manager anticipates the future c. manager achieve harmony of individual efforts d. manager monitor program activities	CO1	1
The process of familiarizing the new employees to the organization rules and regulations is known as _____ a. Placement b. Induction c. Recruitment d. Selection	CO2	1
Basic managerial functions of HRM are _____ a. Planning, organizing, staffing b. Planning, organizing and co-ordinating c. Planning, organizing, directing and controlling d. None of these	CO3	1
_____ is the process of reporting or increasing knowledge or skill of an employee to do a particular job. a. Training b. Development c. Motivation d. Leadership	CO4	1
As per Maslow's hierarchy of needs, individuals are motivated by fulfilling which of the following human needs? a. Physiological needs b. Safety needs c. Esteem needs d. All of these	CO1	1
As per Herzberg's two-factor theory, job factors are divided into two categories: Hygiene factors and _____ a. Safety needs b. Esteem needs c. motivators d. None of these	CO4	1
_____ is a factual statement of tasks & duties involved in a job.	CO4	1

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	a. Job description	b. Job specification	c. Job Analysis	d. Job evaluation	
9	The term _____ refers to the regular review of an employee's job performance and overall contribution to a company.				CO4
	a. Motivation	b. performance	c. Leadership	d. All of these	
10	Expectancy theory posits that individuals choose to engage in certain behaviors based on the _____				CO5
	a. Leadership	b. Recruitment	c. expected outcomes	d. None of these	
11	Compensation administration is the process of managing a company's _____				CO5
	a. Motivation	b. compensation program	c. Edgman needs	d. All of these	
12	_____ is a process where employees negotiate with their employers through unions to determine their employment terms.				CO5
	a. Recruitment	b. Leadership	c. Collective bargaining	d. None of these	
Q. 2	Solve the following.				
A)	Explain the concept of Human Resources Management.				CO1
B)	Explain the different recruitment sources in the organisation.				CO1
Q. 3	Solve the following.				
A)	Explain the different training methods.				CO2
B)	Explain the concept of career, and the value of effective career development				CO2
Q. 4	Solve Any Two of the following.				
A)	Explain the Maslow's hierarchy of needs theory of motivation.				CO4
B)	What are the new trends in work scheduling?				CO3
C)	Explain the performance appraisal and expectancy theory.				CO3
Q. 5	Write Short Notes on Any Two of the following.				
A)	Performance appraisal				CO4
B)	Criteria for rewards.				CO4
C)	Concept of Discipline				CO4
Q. 6	Write Short Notes on Any Two of the following.				
A)	Collective Bargaining				CO5
B)	Types of research in HRM				CO5
C)	Safety and Health of Employees				CO5

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Regular/Supplementary Winter Examination – 2024

Sem: B.Tech

Branch: Computer Engineering/Computer Science & Engineering

Syllabus Code & Name: BTHMS058/ BTHC058B Business Communication

Max Marks: 80

Date: 22/02/2025

Duration: 1 hr.

Instructions to the Students:

1. Examination carries 12 marks.
2. Question No. 1 will be compulsory and include objective-type questions.
3. Candidates are required to attempt any four (out of five) from Question No. 2 to Question No. 6.
4. The left of question/expected answer as per OBM of the Course Outcome (CO) in which the question is based is mentioned in () in front of the question.
5. Use of non-programmable scientific calculator is allowed.
6. Assume suitable data wherever necessary and mention it clearly.

				Level/CO	Mark
Q.1 Objective type questions. (Compulsory Questions)					1
1. Communication means _____ information, feeling and thoughts, with others.				Remember	1
a. To receive b. Exchange of c. Conveying d. All the above					
2. Organismic communication is associated with _____ communication.				Analysis	1
a. Formal b. Informal c. Horizontal d. Vertical					
3. Cultural communication is a _____				Understand	1
a. Non-Verbal Message b. Direct conversation c. Written d. Oral					
4. The most basic type of listening is known as _____				Remember	1
a. Discriminative listening b. Comprehension listening c. Appreciative listening d. Evaluative					
5. Smiles and frowns are part of _____ communication.				Understand	1
a. Formal b. Informal c. Horizontal d. Vertical					
6. _____ refers to mental disturbances.				Analysis	1
a. Aphorism b. Action c. Disruption d. Psychological noise					
7. According to Provençal (Spoken language), tones are classified into _____ categories.				Understand	1
a. 2 b. 4 c. 5 d. 6					
8. Report prepared in a prescribed form and prepared according to an established procedure is _____ report.				Analysis	1
a. Formal b. Informal c. Statutory d. General					
9. It starts by drawing a list of the items of business to be transacted at the meeting.				Understand	1
a. Minutes b. Resolution c. Invitation d. Agenda					
10. While giving an interview, be _____ in your salary expectations.				Remember	1
a. Modest b. Unrealistic c. realistic d. None of these					

11	_____ means the position in which you hold your body when standing or sitting.			
	a. Gestures	b. Postures	c. Paralanguage	d. Proxemics
12	Errors in language, grammar or visual representation of facts take away)			
	a. Clarity	b. Correctness	c. Crispness	d. Coherence
Q. 2	Solve the following.			
A)	Explain the role of different process involved in business communication.			
B)	What is an example of the sociolinguistic competence area of the communicative competence model?			
Q. 3	Solve the following.			
A)	What are some examples of barriers that can exist in intercultural Communication?			
B)	What are some common areas where conflict may arise between people belonging to different cultures?			
Q. 4	Solve Any Two of the following.			
A)	What are some barriers to communication? How do you overcome common barriers to change?			
B)	Why is listening important? What are the different types of listening?			
C)	What are the different communication styles?			
Q. 5	Solve Any Two of the following.			
A)	What are the challenges of organizational communication?			
B)	What are the challenges of persuasive communication?			
C)	What are some approaches you take when collaborating with others?			
Q. 6	Solve Any Two of the following.			
A)	What is the role of technology in international business communication?			
B)	How does culture move from one place to another?			
C)	What are the most important skills for a leader to have?			
*** End ***				