Seat No: _____

PARUL UNIVERSITY FACULTY OF ENGINEERING & TECHNOLOGY

B.Tech. Winter 2022-23 Examination

Semester: 3

Subject Code: 203101217/203101209 Subject Name: Analysis of Mechanism and Machine Elements

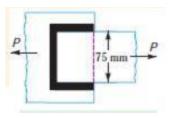
Date:11-10-2022 Time: 02:00 PM TO 04:30 PM Total Marks: 60

Instructions: 1. All questions are compulsory. 2. Figures to the right indicate full marks. 3. Make suitable assumptions wherever necessary. 4. Start new question on new page. Q1 Objective Type Questions - (All are compulsory) (Each of one mark) (15) 1. Provide any example of completely constrained motion. (15) 2. According to Grashof's law for four bar mechanism,holds true where shortest (S) and longest link (L) lengths and remaining two link lengths are P and Q. (15) 3. The total number of 1-centres (N) for a mechanism with n number of links is given by N =		
 2. Figures to the right indicate full marks. 3. Make suitable assumptions wherever necessary. 4. Start new question on new page. Q.1 Objective Type Questions - (All are compulsory) (Each of one mark) (15) Provide any example of completely constrained motion. According to Grashof's law for four bar mechanism holds true where shortest (S) and longest link (L) lengths and remaining two link lengths are P and Q. The total number of I-centres (N) for a mechanism with n number of links is given by N = The of rivet is the distance between two consecutive rivets measured parallel to the direction of the force in the structural member. 5. Tangential component of acceleration acts to the link. 6. Machine is a collection of arranged to transmit forces and do work. 7. The algebraic sum of the angular velocities of the two links which are connected by pin joints, multiplied by the radius of the pin is called as joint. 9. Motions which are measured with respect to other moving bodies are known as joint. 9. Motions which are measured with respect to other moving body. 10. The parallel fillet welded joint is designed for strength. 11. For a Whitworth quick return motion mechanism β = 110°. Find the ratio of time of cutting stroke to time of return stroke. a) 0.42 b) 0.44 c) 2.27 d) 2.37 d) none 13. Represent a velocity of link B relative to link A. 14. State the type of inversion used in rotary internal combustion engine. 15. The locus of the instantaneous centre in space during a definite motion of the body is called as Q2. Answer the following questions. (Attempt any three) A) Differentiate between closed and unclosed pair. B) Describe the D/Alembert's principle. C) State the trype of inversion used in rotary in		
 3. Make suitable assumptions wherever necessary. 4. Start new question on new page. (15) Provide any example of completely constrained motion. According to Grashof's law for four bar mechanismholds true where shortest (S) and longest link (L) lengths and remaining two link lengths are P and Q. The total number of I-centres (N) for a mechanism with n number of links is given by N = The total number of I-centres (N) for a mechanism with n number of links is given by N = The total number of I-centres (N) for a mechanism with n number of links is given by N = The total number of I-centres (N) for a mechanism with n number of links is given by N = The algebraic sum of the structural member. Tangential component of acceleration acts to the link. Matchine is a collection of arranged to transmit forces and do work. The algebraic sum of the angular velocities of the two links which are connected by pin joints, multiplied by the radius of the pin is called asjoint. Motions which are measured with respect to other moving bodies are known asjoint. Motions which are measured with respect to other moving bodies are known asjoint. Motions which are measured with respect to other moving bodies are known asjoint. Motions which are measured with respect to other moving bodies are known asjoint. Motions which are measured with respect to other moving bodies are hown as Motions which are understoke. Motal Motal J. For a Whitworth quick return motion mechanism β = 110°. Find the ratio of time of cutting stroke to time of return stroke. Motal Motal<th></th><th></th>		
 4. Start new question on new page. Q1 Objective Type Questions - (All are compulsory) (Each of one mark) (15) Provide any example of completely constrained motion. According to Grashof's law for four bar mechanism,holds true where shortest (S) and longest link (L) lengths and remaining two link lengths are P and Q. The total number of I-centres (N) for a mechanism with n number of links is given by N = The of rivet is the distance between two consecutive rivets measured parallel to the direction of the force in the structural member. Tangential component of acceleration acts to the link. Machine is a collection of arranged to transmit forces and do work. The algebraic sum of the angular velocities of the two links which are connected by pin joints, multiplied by the radius of the pin is called as joint. Motions which are measured with respect to ther moving bodies are known as joint. Motions which are measured with respect to other moving bodies are known as joint. Motions which are measured with respect to ther moving bodies are known as joint. The parallel fillet welded joint is designed for strength. For a Whitworth quick return motion mechanism β = 110°. Find the ratio of time of cutting stroke to time of return stroke. 0.42 0.44 2.27 0.2.37 12. The lower pairs arepairs. a) self-closed d) none 13. Represent a velocity of link B relative to link A. 14. State the type of inversion used in rotary internal combustion engine. 15. The locus of the instantaneous centre in space during a definite motion of the body is called as Q2 Answer the following questions. (Attempt any three) A) Differentiate between closed and unclosed pair. B) Describe the D/Alember's principle. S		
Q.1 Objective Type Questions - (All are compulsory) (Each of one mark) (15) 1. Provide any example of completely constrained motion. (15) 2. According to Grashof's law for four bar mechanism,holds true where shortest (S) and longest link (L) lengths and remaining two link lengths are P and Q. (16) 3. The total number of 1-centres (N) for a mechanism with n number of links is given by N = (17) 4. The of rivet is the distance between two consecutive rivets measured parallel to the direction of the force in the structural member. (18) 5. Tangential component of acceleration acts to the link. (18) 6. Machine is a collection of arranged to transmit forces and do work. (17) 7. The algebraic sum of the angular velocities of the two links which are connected by pin joints, multiplied by the radius of the pin is called as		
 Provide any example of completely constrained motion. According to Grashof's law for four bar mechanism,holds true where shortest (S) and longest link (L) lengths and remaining two link lengths are P and Q. The total number of I-centres (N) for a mechanism with n number of links is given by N = The of rivet is the distance between two consecutive rivets measured parallel to the direction of the force in the structural member. Tangential component of acceleration acts to the link. Machine is a collection of arranged to transmit forces and do work. The algebraic sum of the angular velocities of the two links which are connected by pin joints, multiplied by the radius of the pin is called as joint. Motions which are measured with respect to other moving bodies are known as motion of a body with respect to the moving body. The parallel fillet welded joint is designed for strength. For a Whitworth quick return motion mechanism β = 110°. Find the ratio of time of cutting stroke to time of return stroke. 0.42 0.42 0.42 0.43 2.27 d) 2.37 The lower pairs are pairs. a) self-closed c) friction-closed d) none Represent a velocity of link B relative to link A. State the type of inversion used in rotary internal combustion engine. The locus of the instantaneous centre in space during a definite motion of the body is called as Q. Answer the following questions. (Attempt any three) A) Differentiate between closed and unclosed pair. B) Describe the DAlembert's principle. Q. State principle of virtual work D) State the stresses developed in shaft. Q. A) Explain in details the types of welde	4. Start new question on new page.	
and longest link (L) lengths and remaining two link lengths are P and Q. 3. The total number of I-centres (N) for a mechanism with n number of links is given by N = 4. The	1. Provide any example of completely constrained motion.	(15)
4. The	and longest link (L) lengths and remaining two link lengths are P and Q.	
direction of the force in the structural member. 5. Tangential component of acceleration acts		
6. Machine is a collection of arranged to transmit forces and do work. 7. The algebraic sum of the angular velocities of the two links which are connected by pin joints, multiplied by the radius of the pin is called as 8. Join between two plates in the same plane is known asjoint. 9. Motions which are measured with respect to other moving bodies are known as 10. The parallel fillet welded joint is designed forstrength. 11. For a Whitworth quick return motion mechanism $\beta = 110^\circ$. Find the ratio of time of cutting stroke to time of return stroke. a) 0.42 b) 0.44 c) 2.27 d) 2.37 12. The lower pairs arepairs. a) self-closed b) forced-closed c) friction-closed d) none 13. Represent a velocity of link B relative to link A. 14. State the type of inversion used in rotary internal combustion engine. 15. The locus of the instantaneous centre in space during a definite motion of the body is called as Q.2 Answer the following questions. (Attempt any three) A) Differentiate between closed and unclosed pair. B) Describe the D'Alembert's principle. C) State principle of virtual work D) State the stresses developed in shaft. Q.3 A) Explain in details the types of welded joints and its advantages over riveted joints. (07) B) A propeller shaft is required to transmit 45 kW power at 500 rpm. It is a hollow shaft, having an inside diameter 0.6 times of outside diameter. It is made of plain carbon steel and the	direction of the force in the structural member	
7. The algebraic sum of the angular velocities of the two links which are connected by pin joints, multiplied by the radius of the pin is called as		
multiplied by the radius of the pin is called as		
 9. Motions which are measured with respect to other moving bodies are known asmotion of a body with respect to the moving body. 10. The parallel fillet welded joint is designed forstrength. 11. For a Whitworth quick return motion mechanism β = 110°. Find the ratio of time of cutting stroke to time of return stroke. a) 0.42 b) 0.44 c) 2.27 d) 2.37 12. The lower pairs arepairs. a) self-closed b) forced-closed c) friction-closed d) none 13. Represent a velocity of link B relative to link A. 14. State the type of inversion used in rotary internal combustion engine. 15. The locus of the instantaneous centre in space during a definite motion of the body is called as Q.2 Answer the following questions. (Attempt any three) (15) A) Differentiate between closed and unclosed pair. B) Describe the D'Alembert's principle. C) State principle of virtual work D) State the stresses developed in shaft. Q.3 A) Explain in details the types of welded joints and its advantages over riveted joints. (07) B) A propeller shaft is required to transmit 45 kW power at 500 rpm. It is a hollow shaft, having an inside diameter 0.6 times of outside diameter. It is made of plain carbon steel and the 	multiplied by the radius of the pin is called as	
motion of a body with respect to the moving body. 10. The parallel fillet welded joint is designed for strength. 11. For a Whitworth quick return motion mechanism $\beta = 110^{\circ}$. Find the ratio of time of cutting stroke to time of return stroke. a) 0.42 b) 0.44 c) 2.27 d) 2.37 12. The lower pairs arepairs. a) self-closed b) forced-closed c) friction-closed d) none 13. Represent a velocity of link B relative to link A. 14. State the type of inversion used in rotary internal combustion engine. 15. The locus of the instantaneous centre in space during a definite motion of the body is called as Q.2 Answer the following questions. (Attempt any three) A) Differentiate between closed and unclosed pair. B) Describe the D'Alembert's principle. C) State principle of virtual work D) State the stresses developed in shaft. Q.3 A) Explain in details the types of welded joints and its advantages over riveted joints. (07) B) A propeller shaft is required to transmit 45 kW power at 500 rpm. It is a hollow shaft, having an inside diameter 0.6 times of outside diameter. It is made of plain carbon steel and the		
 10. The parallel fillet welded joint is designed forstrength. 11. For a Whitworth quick return motion mechanism β = 110°. Find the ratio of time of cutting stroke to time of return stroke. a) 0.42 b) 0.44 c) 2.27 d) 2.37 12. The lower pairs arepairs. a) self-closed b) forced-closed c) friction-closed d) none 13. Represent a velocity of link B relative to link A. 14. State the type of inversion used in rotary internal combustion engine. 15. The locus of the instantaneous centre in space during a definite motion of the body is called as Q.2 Answer the following questions. (Attempt any three) A) Differentiate between closed and unclosed pair. B) Describe the D'Alembert's principle. C) State principle of virtual work D) State the stresses developed in shaft. Q.3 A) Explain in details the types of welded joints and its advantages over riveted joints. (07) B) A propeller shaft is required to transmit 45 kW power at 500 rpm. It is a hollow shaft, having an inside diameter 0.6 times of outside diameter. It is made of plain carbon steel and the 		
stroke to time of return stroke. a) 0.42 b) 0.44 c) 2.27 d) 2.37 12. The lower pairs arepairs. a) self-closed b) forced-closed c) friction-closed d) none 13. Represent a velocity of link B relative to link A. 14. State the type of inversion used in rotary internal combustion engine. 15. The locus of the instantaneous centre in space during a definite motion of the body is called as Q.2 Answer the following questions. (Attempt any three) A) Differentiate between closed and unclosed pair. B) Describe the D'Alembert's principle. C) State principle of virtual work D) State the stresses developed in shaft. Q.3 A) Explain in details the types of welded joints and its advantages over riveted joints. (07) B) A propeller shaft is required to transmit 45 kW power at 500 rpm. It is a hollow shaft, having an inside diameter 0.6 times of outside diameter. It is made of plain carbon steel and the	motion of a body with respect to the moving body.	
stroke to time of return stroke. a) 0.42 b) 0.44 c) 2.27 d) 2.37 12. The lower pairs arepairs. a) self-closed b) forced-closed c) friction-closed d) none 13. Represent a velocity of link B relative to link A. 14. State the type of inversion used in rotary internal combustion engine. 15. The locus of the instantaneous centre in space during a definite motion of the body is called as Q.2 Answer the following questions. (Attempt any three) A) Differentiate between closed and unclosed pair. B) Describe the D'Alembert's principle. C) State principle of virtual work D) State the stresses developed in shaft. Q.3 A) Explain in details the types of welded joints and its advantages over riveted joints. (07) B) A propeller shaft is required to transmit 45 kW power at 500 rpm. It is a hollow shaft, having an inside diameter 0.6 times of outside diameter. It is made of plain carbon steel and the	10. The parallel fillet welded joint is designed for strength.	
 a) 0.42 b) 0.44 c) 2.27 d) 2.37 12. The lower pairs arepairs. a) self-closed b) forced-closed c) friction-closed d) none 13. Represent a velocity of link B relative to link A. 14. State the type of inversion used in rotary internal combustion engine. 15. The locus of the instantaneous centre in space during a definite motion of the body is called as Q.2 Answer the following questions. (Attempt any three) A) Differentiate between closed and unclosed pair. B) Describe the D'Alembert's principle. C) State principle of virtual work D) State the stresses developed in shaft. Q.3 A) Explain in details the types of welded joints and its advantages over riveted joints. (07) B) A propeller shaft is required to transmit 45 kW power at 500 rpm. It is a hollow shaft, having an inside diameter 0.6 times of outside diameter. It is made of plain carbon steel and the 	11. For a Whitworth quick return motion mechanism $\beta = 110^{\circ}$. Find the ratio of time of cutting	
 b) 0.44 c) 2.27 d) 2.37 12. The lower pairs arepairs. a) self-closed b) forced-closed c) friction-closed d) none 13. Represent a velocity of link B relative to link A. 14. State the type of inversion used in rotary internal combustion engine. 15. The locus of the instantaneous centre in space during a definite motion of the body is called as Q.2 Answer the following questions. (Attempt any three) A) Differentiate between closed and unclosed pair. B) Describe the D'Alembert's principle. C) State principle of virtual work D) State the stresses developed in shaft. Q.3 A) Explain in details the types of welded joints and its advantages over riveted joints. (07) B) A propeller shaft is required to transmit 45 kW power at 500 rpm. It is a hollow shaft, having an inside diameter 0.6 times of outside diameter. It is made of plain carbon steel and the 		
 c) 2.27 d) 2.37 12. The lower pairs arepairs. a) self-closed b) forced-closed c) friction-closed d) none 13. Represent a velocity of link B relative to link A. 14. State the type of inversion used in rotary internal combustion engine. 15. The locus of the instantaneous centre in space during a definite motion of the body is called as Q.2 Answer the following questions. (Attempt any three) A) Differentiate between closed and unclosed pair. B) Describe the D'Alembert's principle. C) State principle of virtual work D) State the stresses developed in shaft. Q.3 A) Explain in details the types of welded joints and its advantages over riveted joints. (07) B) A propeller shaft is required to transmit 45 kW power at 500 rpm. It is a hollow shaft, having an inside diameter 0.6 times of outside diameter. It is made of plain carbon steel and the 		
 d) 2.37 12. The lower pairs arepairs. a) self-closed b) forced-closed c) friction-closed d) none 13. Represent a velocity of link B relative to link A. 14. State the type of inversion used in rotary internal combustion engine. 15. The locus of the instantaneous centre in space during a definite motion of the body is called as Q.2 Answer the following questions. (Attempt any three) A) Differentiate between closed and unclosed pair. B) Describe the D'Alembert's principle. C) State principle of virtual work D) State the stresses developed in shaft. Q.3 A) Explain in details the types of welded joints and its advantages over riveted joints. (07) B) A propeller shaft is required to transmit 45 kW power at 500 rpm. It is a hollow shaft, having an inside diameter 0.6 times of outside diameter. It is made of plain carbon steel and the 		
 12. The lower pairs arepairs. a) self-closed b) forced-closed c) friction-closed d) none 13. Represent a velocity of link B relative to link A. 14. State the type of inversion used in rotary internal combustion engine. 15. The locus of the instantaneous centre in space during a definite motion of the body is called as Q.2 Answer the following questions. (Attempt any three) A) Differentiate between closed and unclosed pair. B) Describe the D'Alembert's principle. C) State principle of virtual work D) State the stresses developed in shaft. Q.3 A) Explain in details the types of welded joints and its advantages over riveted joints. (07) B) A propeller shaft is required to transmit 45 kW power at 500 rpm. It is a hollow shaft, having an inside diameter 0.6 times of outside diameter. It is made of plain carbon steel and the 		
 a) self-closed b) forced-closed c) friction-closed d) none 13. Represent a velocity of link B relative to link A. 14. State the type of inversion used in rotary internal combustion engine. 15. The locus of the instantaneous centre in space during a definite motion of the body is called as Q.2 Answer the following questions. (Attempt any three) A) Differentiate between closed and unclosed pair. B) Describe the D'Alembert's principle. C) State principle of virtual work D) State the stresses developed in shaft. Q.3 A) Explain in details the types of welded joints and its advantages over riveted joints. (07) B) A propeller shaft is required to transmit 45 kW power at 500 rpm. It is a hollow shaft, having an inside diameter 0.6 times of outside diameter. It is made of plain carbon steel and the 		
 b) forced-closed c) friction-closed d) none 13. Represent a velocity of link B relative to link A. 14. State the type of inversion used in rotary internal combustion engine. 15. The locus of the instantaneous centre in space during a definite motion of the body is called as Q.2 Answer the following questions. (Attempt any three) A) Differentiate between closed and unclosed pair. B) Describe the D'Alembert's principle. C) State principle of virtual work D) State the stresses developed in shaft. Q.3 A) Explain in details the types of welded joints and its advantages over riveted joints. (07) B) A propeller shaft is required to transmit 45 kW power at 500 rpm. It is a hollow shaft, having an inside diameter 0.6 times of outside diameter. It is made of plain carbon steel and the 		
 c) friction-closed d) none 13. Represent a velocity of link B relative to link A. 14. State the type of inversion used in rotary internal combustion engine. 15. The locus of the instantaneous centre in space during a definite motion of the body is called as Q.2 Answer the following questions. (Attempt any three) A) Differentiate between closed and unclosed pair. B) Describe the D'Alembert's principle. C) State principle of virtual work D) State the stresses developed in shaft. Q.3 A) Explain in details the types of welded joints and its advantages over riveted joints. (07) B) A propeller shaft is required to transmit 45 kW power at 500 rpm. It is a hollow shaft, having an inside diameter 0.6 times of outside diameter. It is made of plain carbon steel and the 		
 d) none 13. Represent a velocity of link B relative to link A. 14. State the type of inversion used in rotary internal combustion engine. 15. The locus of the instantaneous centre in space during a definite motion of the body is called as Q.2 Answer the following questions. (Attempt any three) A) Differentiate between closed and unclosed pair. B) Describe the D'Alembert's principle. C) State principle of virtual work D) State the stresses developed in shaft. Q.3 A) Explain in details the types of welded joints and its advantages over riveted joints. (07) B) A propeller shaft is required to transmit 45 kW power at 500 rpm. It is a hollow shaft, having an inside diameter 0.6 times of outside diameter. It is made of plain carbon steel and the 		
 13. Represent a velocity of link B relative to link A. 14. State the type of inversion used in rotary internal combustion engine. 15. The locus of the instantaneous centre in space during a definite motion of the body is called as Q.2 Answer the following questions. (Attempt any three) A) Differentiate between closed and unclosed pair. B) Describe the D'Alembert's principle. C) State principle of virtual work D) State the stresses developed in shaft. Q.3 A) Explain in details the types of welded joints and its advantages over riveted joints. (07) B) A propeller shaft is required to transmit 45 kW power at 500 rpm. It is a hollow shaft, having an inside diameter 0.6 times of outside diameter. It is made of plain carbon steel and the 		
 14. State the type of inversion used in rotary internal combustion engine. 15. The locus of the instantaneous centre in space during a definite motion of the body is called as Q.2 Answer the following questions. (Attempt any three) A) Differentiate between closed and unclosed pair. B) Describe the D'Alembert's principle. C) State principle of virtual work D) State the stresses developed in shaft. Q.3 A) Explain in details the types of welded joints and its advantages over riveted joints. (07) B) A propeller shaft is required to transmit 45 kW power at 500 rpm. It is a hollow shaft, having an inside diameter 0.6 times of outside diameter. It is made of plain carbon steel and the 		
 15. The locus of the instantaneous centre in space during a definite motion of the body is called as Q.2 Answer the following questions. (Attempt any three) A) Differentiate between closed and unclosed pair. B) Describe the D'Alembert's principle. C) State principle of virtual work D) State the stresses developed in shaft. Q.3 A) Explain in details the types of welded joints and its advantages over riveted joints. B) A propeller shaft is required to transmit 45 kW power at 500 rpm. It is a hollow shaft, having an inside diameter 0.6 times of outside diameter. It is made of plain carbon steel and the 		
 A) Differentiate between closed and unclosed pair. B) Describe the D'Alembert's principle. C) State principle of virtual work D) State the stresses developed in shaft. Q.3 A) Explain in details the types of welded joints and its advantages over riveted joints. (07) B) A propeller shaft is required to transmit 45 kW power at 500 rpm. It is a hollow shaft, having an inside diameter 0.6 times of outside diameter. It is made of plain carbon steel and the 		
 A) Differentiate between closed and unclosed pair. B) Describe the D'Alembert's principle. C) State principle of virtual work D) State the stresses developed in shaft. Q.3 A) Explain in details the types of welded joints and its advantages over riveted joints. (07) B) A propeller shaft is required to transmit 45 kW power at 500 rpm. It is a hollow shaft, having an inside diameter 0.6 times of outside diameter. It is made of plain carbon steel and the 	Q.2 Answer the following questions. (Attempt any three)	(15)
 B) Describe the D'Alembert's principle. C) State principle of virtual work D) State the stresses developed in shaft. Q.3 A) Explain in details the types of welded joints and its advantages over riveted joints. (07) B) A propeller shaft is required to transmit 45 kW power at 500 rpm. It is a hollow shaft, having an inside diameter 0.6 times of outside diameter. It is made of plain carbon steel and the 		
 D) State the stresses developed in shaft. Q.3 A) Explain in details the types of welded joints and its advantages over riveted joints. (07) B) A propeller shaft is required to transmit 45 kW power at 500 rpm. It is a hollow shaft, having an inside diameter 0.6 times of outside diameter. It is made of plain carbon steel and the 	•	
 Q.3 A) Explain in details the types of welded joints and its advantages over riveted joints. (07) B) A propeller shaft is required to transmit 45 kW power at 500 rpm. It is a hollow shaft, having an inside diameter 0.6 times of outside diameter. It is made of plain carbon steel and the 		
B) A propeller shaft is required to transmit 45 kW power at 500 rpm. It is a hollow shaft, having (08) an inside diameter 0.6 times of outside diameter. It is made of plain carbon steel and the		
an inside diameter 0.6 times of outside diameter. It is made of plain carbon steel and the	Q.3 A) Explain in details the types of welded joints and its advantages over riveted joints.	(07)
	an inside diameter 0.6 times of outside diameter. It is made of plain carbon steel and the	(08)
O D		

OR

B) A plate 75 mm wide and 12.5 mm thick is joined with another plate by a single transverse weld (08) and a double parallel fillet weld as shown in Figure. The maximum tensile and shear stresses are

70 MPa and 56 MPa respectively. Find the length of each parallel fillet weld, if the joint is subjected to static loading.



Q.4 A) Explain in detail the types of riveted joints and design criterions.

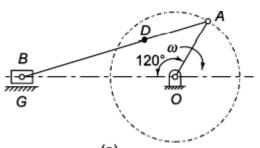
(07)

(08)

A) Explain in detail the shaft design when only subjected to bending moment. (07)

OR

B)



Above fig. shows configuration of an engine mechanism. The dimensions are following: Crank OA=200mm, connecting rod AB=600mm, distance of centre of mass from crank end, AD = 200mm. At the instant, the crank has an angular velocity of 50 rad/s clockwise and an angular acceleration of 800 rad/s^2. Calculate the

- 1) Velocity of D and angular velocity of AB
- 2) Acceleration of D and angular acceleration of AB