H.T No: | | | | | | | | | | | **R18** **Course Code: A30182**

CMR COLLEGE OF ENGINEERING & TECHNOLOGY

(UGC AUTONOMOUS)

B.Tech IV Semester Supplementary Examinations January-2025

Course Name: Fluid Mechanics & Hydraulic Machines

(Mechanical Engineering)

Date: 09.01.2025 AN **Time: 3 hours** **Max.Marks: 70**

(Note: Assume suitable data if necessary)

PART-A

Answer all TEN questions

Each question carries TWO marks. **10x2=20M**

1.	List the various fluid pressure measuring devices.	2 M
2.	State Newton's law of viscosity.	2 M
3.	What is the difference between steady and unsteady flow?	2 M
4.	Define Bernoulli's equation with assumptions.	2 M
5.	What is loss of head due to friction?	2 M
6.	Define laminar and turbulent boundary layer.	2 M
7.	Write the expression for the force exerted by a jet on a stationary inclined flat plate.	2 M
8.	Give example for a low head, medium head and high head turbine.	2 M
9.	How pumps are classified?	2 M
10.	Define cavitation in pump.	2 M

PART-B

Answer the following. Each question carries TEN Marks. **5x10=50M**

11.A).	Define the following properties. i) Specific gravity ii) viscosity iii) surface tension iv) Vapour pressure v) Density.	10M
	OR	
11. B).	If the velocity distribution over a plate is given by $u= (2/3)\ y-y^2$ in which u is the velocity in meter per second at a distance y meter above the plate, estimate the shear stress at y=0 and y=0.15m. Take dynamic viscosity of fluid as 8.63 poises.	10M
12. A).	A 30 cm diameter pipe, conveying water, branches into two pipes of diameters 20 cm and 15 cm respectively. If the average velocity in the 30 cm diameter pipe is 2.5 m/s, find the discharge in this pipe. Also find the velocity in 15 cm pipe if the average velocity in 20 cm diameter pipe is 2 m/s.	10M
	OR	
12. B).	Formulate an expression for the continuity equation for one dimensional flow.	10M
13. A).	Derive the Darcy Weisbach Equation with suitable diagram.	10M
	OR	
13. B).	Distinguish between Total Energy Line and Hydraulic Gradient Line.	10M
14. A).	A jet of water of diameter 10cm strikes a flat plate normally with a velocity of 15m/s. The plate is moving with a velocity of 6m/s in the direction of the jet and away from the jet. Estimate (i) the force exerted by the jet on the plate (ii) work done by the jet on the plate per second.	10M
	OR	
14. B).	Illustrate the working principle of Pelton wheel and list their merits and demerits.	10M

(P.T.O..)

15. A). A centrifugal pump delivers water against a net head of 14.5 m and a design speed of 1000 rpm. The vanes are curved back to an angle of 30^0 with the periphery. The impeller diameter is 300 mm and outlet width are 50 mm. Find the discharge of the pump if manometric efficiency is 95%. 10M

OR

15. B). A single acting reciprocating pump, running at 50 rpm which delivers $0.01m^3/s$ of water. The diameter of the piston is 200 mm and stroke length 400 mm. Estimate (i) Theoretical discharge of the pump (ii) Coefficient of discharge (iii) Slip and percentage of slip of pump. 10M

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H.T No: | | | | | | | | | | | **R18** **Course Code: A30327**

CMR COLLEGE OF ENGINEERING & TECHNOLOGY

(UGC AUTONOMOUS)

B.Tech IV Semester Supplementary Examinations January-2025

Course Name: Manufacturing Processes

(Mechanical Engineering)

Date: 17.01.2025 AN **Time: 3 hours** **Max.Marks: 70**

(Note: Assume suitable data if necessary)

PART-A

Answer all TEN questions

Each question carries TWO marks. **10x2=20M**

1.	List out any four steps involved in casting.	2 M
2.	Define Shrinkage allowance.	2 M
3.	List any four differences between Hot and Cold working processes.	2 M
4.	Define Forging.	2 M
5.	Differentiate orthogonal and oblique cutting	2 M
6.	What is Taylor's tool life?	2 M
7.	What is Rapid tooling?	2 M
8.	Define welding.	2 M
9.	Define Material removal rate.	2 M
10.	What is a dielectric fluid and give an example?	2 M

PART-B

Answer the following. Each question carries TEN Marks. **5x10=50M**

11.A).	A cylindrical riser must be designed for a sand-casting mould. The casting is a steel rectangular plate with dimensions 7.5 cm x 12.5 cm x 2.0 cm. Previous observations have indicated that the total solidification time (T_S) for this casting is 1.6 min. The cylinder for the riser will have a diameter-to-height ratio = 1.0. Determine the dimensions of the riser so that its Solidification time (T_S) = 2.0 min.	10M
	OR	
11. B).	Explain the Investment casting process with a neat sketch. State its advantages, disadvantages and applications.	10M
12. A).	Define Extrusion and explain the any one of the Extrusion process with the help of the neat sketch.	10M
	OR	
12. B).	Wire is drawn through a draw die with entrance angle = 15^0. Starting diameter is 2.5 mm and final diameter = 2.0 mm. The coefficient of friction at the work–die interface = 0.07. The metal has a strength coefficient K = 205 MPa and a strain-hardening exponent n = 0.20. Determine the draw stress and draw force in this operation.	10M
13. A).	Prove that in orthogonal cutting shear angle can be evaluated by following expression. $\tan\Phi = r\cos\alpha / (1 - r\sin\alpha)$.	10M
	OR	
13. B).	Sketch and explain the geometry of a single point cutting tool.	10M

(P.T.O..)

14. A). Explain with a neat sketch Thermit welding process. 10M

OR

14. B). Explain the working of Oxy-acetylene Gas welding with a neat sketch. 10M

15. A). What is the principle of EDM? Analyze the process parameters effect on MRR and also state the advantages and disadvantages. 10M

OR

15. B). Explain with a neat diagram construction and working of USM process. 10M

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H.T No: | | | | | | | | | | | **R18** **Course Code: A30329**

CMR COLLEGE OF ENGINEERING & TECHNOLOGY

(UGC AUTONOMOUS)

B.Tech IV Semester Supplementary Examinations January-2025

Course Name: Kinematics of Machinery

(Mechanical Engineering)

Date: 20.01.2025 AN **Time: 3 hours** **Max.Marks: 70**

(Note: Assume suitable data if necessary)

PART-A

Answer all TEN questions

Each question carries TWO marks. **10x2=20M**

1. Write an equation for the number of degree of freedom for a kinematic chain. 2 M
2. What is Grashoff's law? 2 M
3. What is the magnitude of corioli's component of acceleration? 2 M
4. How many instantaneous centers are there in a 4-bar mechanism. 2 M
5. List out the approximate straight line mechanisms. 2 M
6. Write the condition of steering. 2 M
7. Mention various types of followers. 2 M
8. Draw the displacement diagram of a follower moving with SHM. 2 M
9. List out the types of gear trains. 2 M
10. Mention various diameters with reference to a gear. 2 M

PART-B

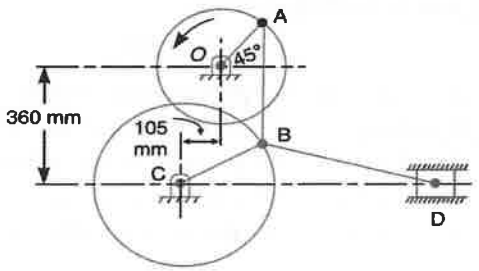
Answer the following. Each question carries TEN Marks. **5x10=50M**

11.A). Define inversion. Describe the inversions of single slider crank chain with neat sketch. 10M

OR

11. B). Explain types of constrained motions with neat sketches. 10M

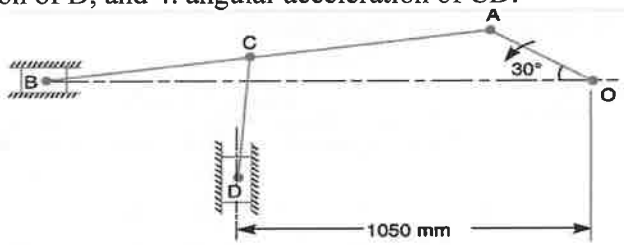
12. A). In the toggle mechanism shown in Fig., the slider D is constrained to move on a horizontal path. The crank OA is rotating in the counter-clockwise direction at a speed of 180 r.p.m. increasing at the rate of 50 rad/s^2. The dimensions of the various links are as follows: OA = 180 mm ; CB = 240 mm ; AB = 360 mm ; and BD = 540 mm. For the given configuration, find 1. Velocity of slider D and angular velocity of BD, and 2. Acceleration of slider D and angular acceleration of BD. 10M



(P.T.O..)

OR

12. B). In the mechanism, as shown in Fig., the crank OA rotates at 20 r.p.m. anticlockwise and gives motion to the sliding blocks B and D. The dimensions of the various links are OA = 300 mm; AB = 1200 mm; BC = 450 mm and CD = 450 mm. For the given configuration, determine : 1. velocities of sliding at B and D, 2. Angular velocity of CD, 3. linear acceleration of D, and 4. angular acceleration of CD. 10M



13. A). Derive an expression for correct condition of steering of an automobile. Which steering gear mechanism fulfils this condition. 10M

OR

13. B). Explain the working of a Pantograph with a neat sketch. Mention some of the applications of it. 10M

14. A). A cam, with a minimum radius of 25 mm, rotating clockwise at a uniform speed is to be designed to give a roller follower, at the end of a valve rod, motion described below : 10M
i) To raise the valve through 50 mm during 120° rotation of the cam ;
ii) To keep the valve fully raised through next 30°;
iii) To lower the valve during next 60°; and
iv) To keep the valve closed during rest of the revolution i.e. 150° ;
The diameter of the roller is 20 mm and the diameter of the cam shaft is 25 mm. Draw the profile of the cam when the line of stroke of the valve rod passes through the axis of the cam shaft. The displacement of the valve, while being raised and lowered, is to take place with simple harmonic motion.

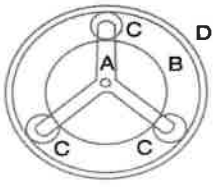
OR

14. B). A cam rotating clockwise at a uniform speed of 200 r.p.m. is required to move with an offset roller follower with a uniform acceleration and retardation on both the outward and return strokes. The angle of ascent, the angle of dwell (between ascent and descent) and the angle of descent is 120°, 60° and 90° respectively. The follower dwells for the rest of cam rotation. The least radius of the cam is 40 mm, the lift of the follower is 25 mm and the diameter of the roller is 10 mm. The line of stroke of the follower is offset by 15 mm from the axis of the cam. Draw the profile of the cam. 10M

15. A). Two gears with 42 and 19 teeth are cut with involute teeth of pressure angle 20^0 and diametral pitch 5. The addendum of each is 5 mm. Find (i) the length of arc of contact (ii) the number of pair of teeth in contact. 10M

OR

15. B). In an epicyclic gear of the 'sun and planet' type shown in Fig., the pitch circle diameter of the internally toothed ring is to be 224 mm and the module 4 mm. When the ring D is stationary, the spider A, which carries three planet wheels C of equal size, is to make one revolution in the same sense as the sun wheel B for every five revolutions of the driving spindle carrying the sun wheel B. Determine suitable numbers of teeth for all the wheels. 10M



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H.T No: | | | | | | | | | | | R18 | Course Code: A30325

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)

B.Tech IV Semester Supplementary Examinations January-2025

Course Name: Applied Thermodynamics

Branch : ME

Date: 27.01.2025 FN **Time: 3 hours** **Max.Marks: 70**

(Note: Assume suitable data if necessary)

PART-A

Answer all TEN questions (Compulsory)

Each question carries TWO marks. **10x2=20M**

1.	Define the following terms (i) Bore (ii) stroke	2 M
2.	List out the differences between the SI engine and CI engine.	2 M
3.	What is meant by ignition delay?	2 M
4.	What are the functions of lubrication?	2 M
5.	Define the following terms i) Brake Power ii) Indicated Power	2 M
6.	Why Morse test is not suitable for single cylinder engine?	2 M
7.	Indicate the important uses of compressed air for engineering purposes.	2 M
8.	What is the effect of clearance on the performance of reciprocating compressor?	2 M
9.	Enumerate important refrigeration applications.	2 M
10.	State merits and demerits of an air refrigeration system.	2 M

PART-B

Answer any FIVE questions. One question from each unit either A or B (Compulsory)

Each question carries TEN Marks. **5x10=50M**

11. A.	With the help of neat sketch, explain the working of Four-stroke spark- ignition engine with salient points.	10M
	OR	
11. B.	Draw the ideal and actual port timing diagrams for two stroke SI and CI engine and discuss the salient points.	10M
12. A.	Explain the effect of various engine variables on SI engine knocking phenomena	10M
	OR	
12. B.	Explain different stages of combustion in CI engine. With the help of p-Θ diagram both theoretical and actual.	10M
13. A.	A twin-cylinder two-stroke engine has a swept volume of 150 cm^3 . The maximum power output is 19 kW at 11000 rpm, bsfc is 0.11 kg/MJ and the air/fuel ratio is 12. If ambient test conditions were 10^0C and 1.03 bar and the fuel has a calorific value of 44 MJ/kg, calculate the brake mean effective pressure, overall efficiency and the volumetric efficiency.	10M
	OR	

(P.T.O)

13. B. A four cylinder, four stroke petrol engine has a 10 cm bore, 15 cm stroke and uses a compression ratio of 6. The engine develops 25 kW indicated power at 2000 rpm. Find the mean indicated pressure and air standard efficiency. Also calculate the fuel consumption per hour, if the indicated thermal efficiency is 30%. Take the calorific value of fuel as 42 MJ/kg. 10M

14. A. Draw the schematic diagram vane compressor and explain working. 10M

OR

14. B A single stage single acting reciprocating air compressor running at 900 rpm delivers air at 12 bar. The induction and free air conditions can be taken as 1 bar and 300 K and the free air delivery as 0.5 m^3 /min. Calculate the bore and stroke, the volumetric efficiency, the indicated power and the isothermal efficiency. Assume the index of compression and expansion is 1.3 10M

15. A. Explain the working of vapour compression refrigeration system. 10M

OR

15. B. **a)** Define the following terms:
(i)Saturated air (ii) dry bulb temperature (iii) Dew point temperature 5M
(iv) Relative humidity (v) Specific humidity
b) Explain about summer air conditioning system. 5M

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