CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)

Examination	:	**B.Tech V Semester Supplementary Examinations June/July-2025**
Course Name	:	**Dynamics of Machinery**
Course Code	:	**A403308**
Branch	:	**Mechanical Engineering**
Date & Session	:	**30-06-2025 FN** **Duration: 3 hours** **Max. Marks: 60**

(Note: Assume suitable data if necessary)
PART-A
Answer all TEN questions
Each question carries ONE mark.   10x1=10M

1.	Enlist the conditions for a body to be in dynamic equilibrium.	1 M
2.	Illustrate the condition for a three force member to be in equilibrium with sketch.	1 M
3.	Distinguish the functions of a Flywheel in I.C engine and in a punching machine by a simple sketch.	1 M
4.	Recall sensitiveness and Hunting of a governor.	1 M
5.	Distinguish between transmission and absorption dynamometers.	1 M
6.	Deduce the relation for a brake to be self-energizing brake.	1 M
7.	Recall the conditions to be satisfied for complete balance of in-line engine.	1 M
8.	Summarize the effects of an unbalanced primary force along the line of stroke of two cylinder locomotive.	1 M
9.	Enlist various methods of finding the natural frequency of free vibrations.	1 M
10.	Define whirling speed of a shaft.	1 M

PART-B
Answer the following. Each question carries TEN Marks.   5x10=50M

11.A).   The turbine rotor of a ship has a mass of 20 tonnes and a radius of gyration 0.75. Its   10M
speed is 2000 rpm. The ship pitches 6^0 above and 6^0 below the horizontal position. One
complete oscillation takes 18 seconds and the motion is simple harmonic. Determine
(i) the maximum couple tending to shear the holding down bolt of the turbine (ii) the
maximum angular acceleration of the ship during pitching (iii) the direction in which the
bow will tend to turn while, if the rotation of the rotor is clockwise when looking from
rear.

OR

11. B).   A horizontal steam engine running at 120 rpm has a bore of 250 mm and a stroke of 400   10M
mm. The connecting rod is 0.6 m long and mass of the reciprocating parts is 60 kg. When
the crank has turned through an angle of 45° from the inner dead centre, the steam
pressure on the cover end side is 550 kN/m² and that on the crank end side is 70 kN/m².
Considering the diameter of the piston rod equal to 50mm, determine: (i) Turning moment
on the crank shaft (ii) Thrust on the bearings, and (iii) Acceleration of the flywheel, if the
power of the engine is 20 kW, mass of the flywheel is 60 kg and radius of gyration 0.6 m.

(P.T.O..)

12. A). The turning moment diagram for a petrol engine is drawn to a vertical scale of 1 mm to 6 Nm and a horizontal scale of 1 mm to 1^0. The turning moment repeats itself after every half revolution of engine. The areas above and below the mean torque line are 305, 710, 50, 350, 980 and 275 mm². The rotating parts amount to a mass of 40 kg at a radius of gyration of 140mm. Calculate the coefficient of fluctuation of speed if the speed of the engine is 1500 rpm. **10M**

OR

12. B). Each arm of a Porter Governor is 180 mm long and its pivoted on the axis of rotation. The mass of each ball is 4 kg and the sleeve is 18 kg. The radius of rotation of the ball is 100 mm when the sleeve begins to raise, and 140 mm when at top. Determine the range of speed, also find the coefficient of insensitiveness if the friction at the sleeve is 15N. **10M**

13. A). (i) Reproduce the sketches of transmission dynamometers and label its salient features. Formulate relevant mathematical equations **5M**

(ii) Sketch a cone clutch and label its salient parts. **5M**

OR

13. B). In a cone clutch with semi-cone angle of 15°, maximum and minimum radii of the contact surface are 120 mm and 80 mm respectively. The speed is 800 rpm and the maximum allowable normal pressure is 150 kN/m² Determine the axial load and the power transmitted taking the coefficient of friction as 0.3. **10M**

14. A). A, B, C and D are four masses carried by a rotating shaft at radii 100, 125, 200 and 150 mm respectively. The planes in which the masses revolve are spaced 600 mm apart and the mass of B, C and D are 10 kg, 5 kg and 4 kg respectively. Find the required mass A and the relative angular settings of the four masses so that the shaft shall be in complete balance. **10M**

OR

14. B). A rotating shaft carries four masses A, B, C and D which are radially attached to it. The mass centres are 30mm, 38mm, 40mm and 35mm respectively from the axis of rotation. The masses A, C and D are 7.5 kg, 5 kg and 4 kg respectively. The axial distance between the planes of rotation of A and B is 400 mm and between B and C is 500 mm. The masses A and C are at right angles to each other. Find for a complete balance: (a) the angle between the masses B and D from mass A. (b) the axial distance between the planes of rotation of C and D and (c) the magnitude of mass B. **10M**

15. A). The mass of a single degree damped vibrating system is 7.5 kg and makes 24 free oscillations in 14 seconds when disturbed from its mean equilibrium position. The amplitude of vibration reduces to 0.25 of its initial value after 5 oscillations. Determine: i) stiffness of the spring   ii) logarithmic decrement iii) damping factor. **10M**

OR

15. B). A flywheel of mass 1 tonne (radius of gyration = 0.5m) is connected at one of the ends of a 200 mm diameter shaft (length = 1.5m). Find the frequency of torsional vibrations, if the other end of the Shaft is fixed (The modulus of rigidity for the shaft material is given as 80 GN/m².) **10M**

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Examination	:	B.Tech V Semester Supplementary Examinations June/July-2025
Course Name	:	Design of Machine Elements
Course Code	:	A403312
Branch	:	Mechanical Engineering
Date & Session	:	02-07-2025 FN Duration: 3 hours Max. Marks: 60

(Note: Assume suitable data if necessary)
PART-A
Answer all TEN questions
Each question carries ONE mark.   **10x1=10M**

1.	What are the steps involved in design of a machine element?	1 M
2.	Define interchangability	1 M
3.	What is endurance limit?	1 M
4.	Draw S-N curve.	1 M
5.	Mention the applications of riveted joints.	1 M
6.	Distinguish the riveted and the bolted joints.	1 M
7.	What is a knuckle joint?	1 M
8.	Why hollow shafts are preferred over solid shafts?	1 M
9.	Write the applications of flange coupling.	1 M
10.	Mention the different types of couplings.	1 M

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

11.A). What are the general considerations in machine design? Give an account of the various   10M
mechanical properties of engineering materials.

OR

11. B). A steel connecting rod is subjected to a completely reversed axial load of 160 kN. Suggest   10M
the suitable diameter of the rod using a factor of safety 2. The ultimate tensile strength of
the material is 1100 MPa, and yield strength 930 MPa. Neglect column action and the
effect of stress concentration

12. A). A machine member is made of plain carbon steel of ultimate strength 650 N/mm2 and   10M
endurance limit of 300 N/mm^2 . The member is subjected to a fluctuating torsional
moment which varies from -200 Nm to 400 Nm. Design the member using (i) Modified
Goodman's equation. (ii) Soderberg equation.

OR

12. B). A simply supported beam has a concentrated load at the centre which fluctuates from a   10M
value of P to 4P. The span of the beam is 500 mm and its cross diameter of 60 mm.
Taking for the beam material, stress of 500 MPa, endurance limit of 330 MPa for reversed
bending, and a factor of safety of 1.3, calculate the maximum value of P. Take a size
factor of 0.85 and a surface finish factor of 0.9.

(P.T.O..)

13. A). Explain with sketches the different types of failures and efficiencies of the riveted joints   10M

OR

13. B). Find the efficiency of the following riveted joints: 10M

(i) Single riveted lap joint of 6 mm plates with 20 mm diameter rivets having a pitch of 50 mm.

(ii) Double riveted lap joint of 6 mm plates with 20 mm diameter rivets having a pitch of 65 mm. If Permissible tensile stress in rivets = 90 MPa, Permissible crushing stress in rivets = 180 MPa.

14. A). Design a cotter joint to connect two mild steel rods for a pull of 30 kN. The maximum permissible stresses are 55 MPa in tension; 40 MPa in shear and 70 MPa in crushing. Draw a neat sketch of the joint designed.   10M

OR

14. B). Design a knuckle joint to connect two mild steel bars under a tensile load of 30 kN. The allowable stresses are 65 MPa in tension, 50 MPa in shear and 83 MPa in crushing.   10M

15. A). Design a cast iron flange coupling for a mild steel shaft transmitting 90 kW at 250 rpm. The allowable shear stress in the shaft is 40 MPa and the angle of twist is not to exceed 1^0 in a length of 20 diameters. The allowable shear stress in the coupling bolts is 30 MPa   10M

OR

15. B). A rigid type of coupling is used to connect two shafts transmitting 15 kW at 200 rpm. The shaft, keys and bolts are made of C45 steel and the coupling is of cast iron. Design the coupling   10M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
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Examination	:	B.Tech V Semester Supplementary Examinations June/July-2025
Course Name	:	Metrology & Machine Tools
Course Code	:	A403310
Branch	:	Mechanical Engineering
Date & Session	:	04-07-2025 FN Duration: 3 hours Max. Marks: 60

(Note: Assume suitable data if necessary)

PART-A
Answer all TEN questions
Each question carries ONE mark.   10x1=10M

1.	Define positive back rake angle.	1 M
2.	Write different types of lathe operations.	1 M
3.	Explain the term counter boring.	1 M
4.	Define reaming operation.	1 M
5.	What is the slab milling operation?	1 M
6.	Explain pull broaching operation.	1 M
7.	Classify the limits and explain bilateral limit system.	1 M
8.	Define interference fit and Give an example for interference fit.	1 M
9.	What is the primary surface Texture?	1 M
10.	What do you mean by macro geometrical error?	1 M

PART-B
Answer the following. Each question carries TEN Marks.   5x10=50M

11.A).	Distinguish orthogonal and oblique cutting methods with neat diagrams.	10M
	OR	
11. B).	Analyze the various types of chips formed in metal cutting and explain their conditions of formation with neat figures.	10M
12. A).	Compare the working principle of shaper and planar machine with diagram.	10M
	OR	
12. B).	Briefly write about grinding wheels and selection of grinding wheels with a neat sketches.	10M
13. A).	Write the different types of broaching machines with neat diagrams and mention the applications.	10M
	OR	
13. B).	Elaborate geometry of end milling cutter with line diagram.	10M
14. A).	i) Describe the terms limit, tolerance, accuracy, precision.	5M
	ii) Define the term upper and lower deviation with respect to hole basis system.	5M
	OR	
14. B).	Calculate the limits of sizes whose diameter 6H7/g6 lies between mean of 3-6 and fundamental deviation for shaft $g= -2.5D^{0.34}$ and identify the type of fit	10M
15. A).	Name the Elements of screw thread with neat diagram.	10M
	OR	
15. B).	Discuss the types of CMM and its applications.	10M

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Examination	:	B.Tech V Semester Supplementary Examinations June/July-2025
Course Name	:	Business Economics & Financial Analysis
Course Code	:	A400102
Branch	:	Mechanical Engineering
Date & Session	:	07-07-2025 FN Duration: 3 hours Max. Marks: 60

(Note: Assume suitable data if necessary)

PART-A
Answer all TEN questions
Each question carries ONE mark.   10x1=10M

1.	What is Macroeconomics?	1 M
2.	Mention contents of partnership deed.	1 M
3.	Write about Demand function.	1 M
4.	What is law of supply?	1 M
5.	What are the Iso -quant features?	1 M
6.	Define CVP analysis.	1 M
7.	What is double entry system.	1 M
8.	What are the Types of accounts?	1 M
9.	Define the ratios.	1 M
10.	Define quick ratio.	1 M

PART-B
Answer the following. Each question carries TEN Marks.   5x10=50M

11.A).	What is joint stock company? Discuss the sources of capital required by a joint stock company.	10M

OR

11. B).	Define business cycle? Explain different phases of business cycle.	10M
12. A).	Define Demand? Briefly explain demand determinants.	10M

OR

12. B).	Explain the demand forecasting. Discuss the methods of demand forecasting.	10M
13. A).	Define perfect competition? And explain price determination under perfect competition.	10M

OR

13. B).	Illustrate break even analysis with the help of a break even chart. How is it helpful for management decisions?	10M
14. A).	Define financial accounting? State the need/importance of financial accounting. What are the functions of financial accounting?	10M

(P.T.O..)

14. B). From the following prepare trading, Profit and loss account, Balance sheet.   10M

Particulars	Dr.	Cr.
Opening stock	1,80,000	
Salaries	10,000	
Rent	5,400	
Machinery	2,750	
Wages	29,000	
Furniture	4,200	
Electricity	5,000	
Trade expenses	2,600	
Debtors	10,500	
Buildings	30,000	
Sales		2,05,000
Loan		10,000
Creditors		15,000
Capital		55,000
Drawings	5,000	
Total	2,85,000	2,85,000

Additional information: Closing stock- Rs. 25,000.

15. A). What is ratio and ratio analysis? Explain the objectives, advantages and limitations of   10M
ratio analysis.

15. B). From the following details calculate: 10M
   i.   Debt-equity ratio
   ii.   Current ratio
   iii. Fixed assets to current assets ratio

Liabilities	Rs.	Assets	Rs.
Share capital	1,00,000	Goodwill	60,000
Reserves	20,000	Fixes assets	1,40,000
Profit &loss a/c	30,000	Stock	30,000
Secured loans	80,000	Debtors	30,000
Creditors	50,000	Advances	10,000
Provision taxation	20,000	Cash	30,000
	3,00,000		3,00,000

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Examination	:	B.Tech V Semester Supplementary Examinations June/July-2025
Course Name	:	CAD/CAM
Course Code	:	A403314
Branch	:	Mechanical Engineering
Date & Session	:	09-07-2025 FN Duration: 3 hours Max. Marks: 60

(Note: Assume suitable data if necessary)

PART-A
Answer all TEN questions
Each question carries ONE mark.   10x1=10M

1.	What is graphic terminal?	1 M
2.	Define curve fitting.	1 M
3.	What is surface modeling?	1 M
4.	Define solid modeling.	1 M
5.	What is post processor?	1 M
6.	Define DNC.	1 M
7.	What is production flow analysis?	1 M
8.	Define MRP.	1 M
9.	Define CIM.	1 M
10.	Define machine vision.	1 M

PART-B
Answer the following. Each question carries TEN Marks.   5x10=50M

11.A).	Briefly explain the conventional process of the product cycle in the conventional manufacturing environment.	10M

OR

11. B).	Explain B-spline curve with a neat figure and state the advantages.	10M
12. A).	Define Bezier surface? Explain various characteristics of this surface.	10M

OR

12. B).	In detail explain the salient features of solid modeling.	10M
13. A).	Explain the concept of adaptive control of NC machines with neat sktech.	10M

OR

13. B).	Differentiate Manual part programming and Computer assisted part programming.	10M
14. A).	What is group technology? When is it suitable in manufacturing? What are its benefits?	10M

OR

14. B).	What is CAPP? Explain with neat sketch about generative CAPP.	10M
15. A).	Draw the FMS layout and explain the function of each component of FMS.	10M

OR

15. B).	Explain about different noncontact optical inspection methods.	10M

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Examination	:	B.Tech V Semester Supplementary Examinations June/July-2025
Course Name	:	Steam Power & Jet Propulsion
Course Code	:	A403311
Branch	:	Mechanical Engineering
Date & Session	:	11-07-2025 FN Duration: 3 hours Max. Marks: 60

(Note: Assume suitable data if necessary)
PART-A
Answer all TEN questions
Each question carries ONE mark.   10x1=10M

1.	Name the process of Rankine cycle.	1 M
2.	Define equivalent evaporation of boiler.	1 M
3.	Classify steam nozzles.	1 M
4.	What are the requirements of steam condensing plant?	1 M
5.	Define diagram efficiency.	1 M
6.	List the methods to reduce the rotor speed.	1 M
7.	Define degree of reaction.	1 M
8.	List out the types of jet propulsive engines.	1 M
9.	What are the conclusions that can be drawn from the expression for Mach number?	1 M
10.	Define the principle of jet and rocket engines.	1 M

PART-B
Answer the following. Each question carries TEN Marks.   5x10=50M

11.A). A simple Rankine cycle works between pressure 28 bar and 0.06 bar, the initial condition of steam being dry saturated, calculate the cycle efficiency, work ratio and specific steam consumption. *(solve with the help of Steam Table)*   10M

OR

11. B). Derive an expression for maximum discharge rate gases through the chimney for a given height of the chimney.   10M

12. A). In a convergent divergent nozzle the steam enters at 15 bar, 300°C and leaves it at a pressure of 2 bar. The inlet velocity to the nozzle is 150 m/s. Find the required throat and exit areas for mass flow rate of 1 kg/s. Assume nozzle efficiency to be 90%. Assume $C_p = 2.4$ kJ/kg K.   10M

OR

12. B). Write a short note and briefly explain the following: 10M
i) Effect of air leakage in steam condenser
ii) Vacuum and condenser efficiency, how does it is differ from it.

(P.T.O..)

13. A). The following data refer to a single stage impulse turbine. Isentropic nozzle entropy   10M
drop = 200 kJ/kg Nozzle efficiency = 90% Nozzle angle = Ratio of blade speed to whirl
component of steam speed = 0.5. Blade coefficient = 0.9. The velocity of steam entering
the nozzle 30m/s. find (i).blade angles at the inlet and outlet if the steam enters the blade
without shock and leaves the blade in the axial direction.(ii) Blade efficiency (iii) power
developed (iv).axial thrust if the steam flow rate is 10kg/s.

OR

13. B). Discuss briefly about velocity and pressure compounding with sufficient diagrams.   10M

14. A). Explain parson reaction turbine with velocity diagram of symbols depict and how to   10M
achieve the maximum efficiency of the turbine with function of entry blade angle.

OR

14. B). Explain working jet propulsive engine then how the aircraft engine makes trust.   10M

15. A). A turbojet is flying with a speed of 850 kmph at an turbine, where air density is   10M
0.17 kg/m^3. The propulsive and overall efficiencies are 55% and 17% respectively. If the
drag on aircraft is 6100 N, calculate the exit velocity of jet, diameter of jet and propulsive
power.

OR

15. B). i) Draw neat sketch and explain briefly about the solid propellant engine.   5M
ii) Discuss monopropellant and bipropellant.   5M

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