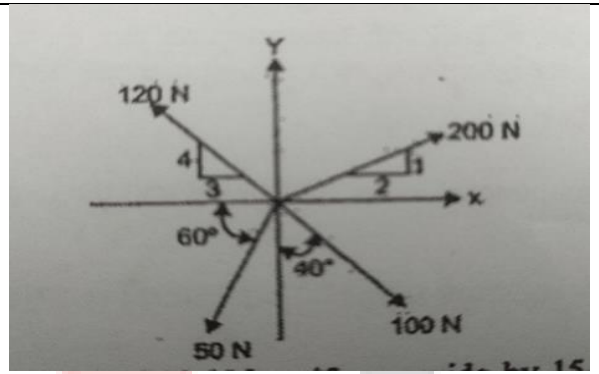
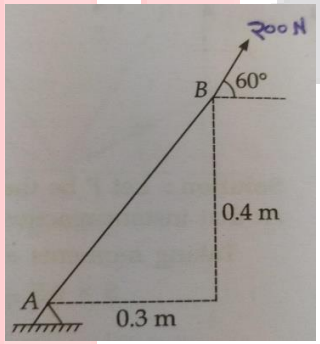
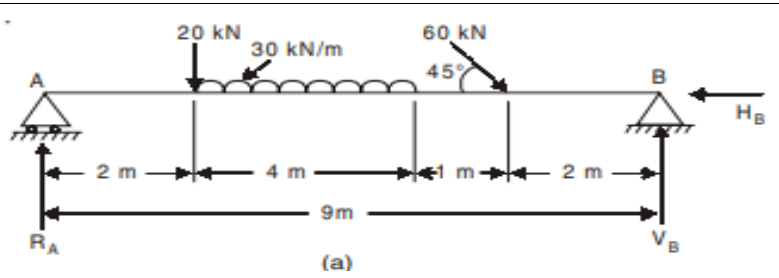
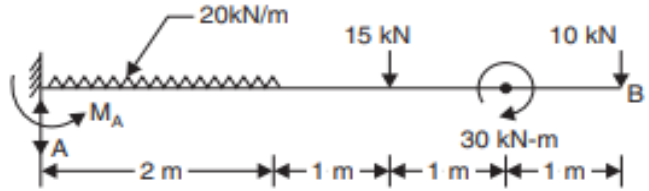
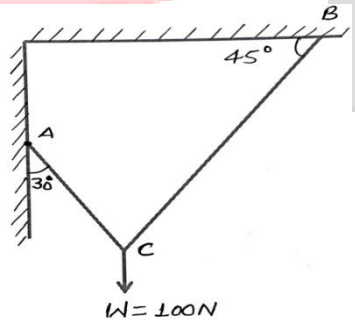
Meerut Institute of Engineering & Technology, Meerut

CO-Wise AKTU Question Bank

Course: B.Tech **Subject Name:** Fund. of Mechanical Engg. **Subject Code:**BME101/201 **Semester:** I /II

CO No.	Lect. No.	Syllabus Topic (As Per LP)	Ques. No.	Question Statement (As Per AKTU)	Session
CO-1	**1**	Force system, moment and couple, Principle of transmissibility	**1**	Explain force system in details.	
CO-1	**1**	Force system, moment and couple, Principle of transmissibility	**2**	What do you mean by moment and couple?	
CO-1	**1**	Force system, moment and couple, Principle of transmissibility	**3**	Explain the principle of transmissibility of forces.	2022-23
CO-1	**1**	Force system, moment and couple, Principle of transmissibility	**4**	Discuss about superposition theorem	2021-22
CO-1	**2**	Varignon's Theorem, Resultant of forces,	**5**	State and prove Varignon’s theorem.	
CO-1	**2**	Varignon's Theorem, Resultant of forces,	**6**	Explain: (a) Resultant of forces, (b) Lami’s theorem.	
CO-1	**2**	Varignon's Theorem, Resultant of forces,	**7**	A system of four forces acting on a body is shown in the figure. Determine the resultant.	2022-23

					
CO-1	**2**	Varignon's Theorem, Resultant of forces,	**8**	A force of 200 N is acting at point B of a lever AB which is hinged at its lower end as shown in figure. Find the moment of force about the hinged end. 	2022-23
CO-1	**3**	Types of supports and loads, equilibrium equation and support reactions.	**9**	Write short notes on :(i) Types of supports (ii) Types of loads	
CO-1	**3**	Types of supports and loads, equilibrium equation and support reactions.	**10**	Find the reactions at supports A and B of the loaded beam shown in Fig.	

					
CO-1	**3**	Types of supports and loads, equilibrium equation and support reactions.	**11**	Compute the reaction developed at support in the cantilever beam shown in Fig. 	
CO-1	**4**	Free body diagram, numericals	**12**	Define the term free body diagram and state the importance of drawing such a diagram.	
CO-1	**4**	Free body diagram, numericals	**13**	A weight of 1000 N is supported by two chains AC and BC as shown in figure. Determine the tension in each chain. 	
CO-1	**5**	Normal and shear Stress, strain, Hooke's' law, Poisson's ratio.	**14**	Define stress. Also explain normal and shear stress with neat sketches.	

CO-1	**5**	Normal and shear Stress, strain, Hooke's' law, Poisson's ratio.	**15**	Define strain and its types.	
CO-1	**5**	Normal and shear Stress, strain, Hooke's' law, Poisson's ratio.	**16**	State the Hooke's law.	2021-22, 2020-21
CO-1	**6**	Various types of Elastic constants and their relationship	**17**	Define the following elastic constants (i) Modulus of elasticity (ii) Modulus of rigidity (iii) Bulk modulus (iv) Poisson's ratio.	2020-21 2021-22
CO-1	**6**	Various types of Elastic constants and their relationship	**18**	Proof that E = 3K (1-2μ), where E is modulus of elasticity, K is bulk modulus and μ is Poisson's ratio.	2021-22
CO-1	**6**	Various types of Elastic constants and their relationship	**19**	Proof that E = 2G (1+μ), where E is modulus of elasticity, G is modulus of rigidity and μ is Poisson's ratio.	
CO-1	**7**	Stress-strain diagram for ductile and brittle materials, factor of safety.	**20**	Draw the stress-strain curve for mild steel and describe its salient points. Also, draw the stress curve for a brittle material.	2022-23, 2020-21
CO-1	**7**	Stress-strain diagram for ductile and brittle materials, factor of safety.	**21**	Define factor of safety.	
CO-1	**8**	Basic Numerical problems on stress, strain and elastic constant.	**22**	A tensile load of 56 kN was applied to a bar of 30 mm diameter with 300 mm gauge length. Measurements showed 0.12 mm increase in length and the corresponding 0.0036 mm contraction in diameter. Make calculations for the Poisson's ratio and the values of three moduli (elastic constants).	
CO-1	**8**	Basic Numerical problems on stress, strain and elastic constant.	**23**	A steel rod of 12 mm in diameter is tested in a testing machine and under the load of 16 kN, the total extension on 200 mm length is 1.4 mm. Find the value of E.	
CO-1	**8**	Basic Numerical problems on stress, strain and elastic constant.	**24**	At an axial load of 22 kN, a 45-mm-wide by 15-mm thick polyimide polymer bar elongates 3.0 mm while the bar width contracts 0.25 mm. The bar is 200 mm long. At the 22-kN load, the stress in the polymer bar is less than its proportional limit. Determine a. The modulus of elasticity. b. Poisson's ratio. c. The change in the bar thicknes	2022-23

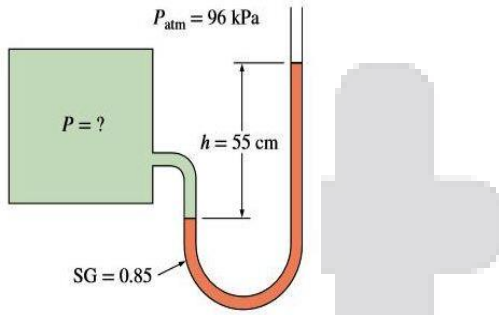
CO2	**9**	Introduction to IC and EC engines, Classification of IC Engine and its components.	**25**	Name the two general classes of combustion engines and state how do they basically differ in principle?	
CO2	**9**	Introduction to IC and EC engines, Classification of IC Engine and its components.	**26**	Define internal combustion engine. Also Write down its advantages and disadvantages. **OR** Discuss the relative advantages and disadvantages of internal combustion and external combustion engines.	2020-21
CO2	**9**	Introduction to IC and EC engines, Classification of IC Engine and its components.	**27**	How internal combustion engines are classified.	
CO2	**9**	Introduction to IC and EC engines, Classification of IC Engine and its components.	**28**	Explain the following component of I.C. engines with sketch: Cylinder, Cylinder head, Piston & Piston rings, Connecting rod, Crank, Crankshaft and Flywheel. **OR** Discuss any four important components of an IC Engine and the major functions of those components.	2022-23, 2021-22
CO2	**10**	IC Engine terminology, Construction and Working of 4-stroke SI & CI engine, Differentiate SI and CI engines.	**29**	Explain the following terms as applied to I.C. engines : Bore, stroke, T.D.C., B.D.C., clearance volume, swept volume, compression ratio.	2021-22
CO2	**10**	IC Engine terminology, Construction and Working of 4-stroke SI & CI engine, Differentiate SI and CI engines.	**30**	Suppose the displacement volume of a v6 engine is 2700m^3 while its clearance volume is 300 m^3, calculate the compression ratio.	
CO2	**10**	IC Engine terminology, Construction and Working of 4-stroke SI & CI engine, Differentiate SI and CI engines.	**31**	Explain with suitable sketches the working of a four-stroke SI engine.	2022-23
CO2	**10**	IC Engine terminology, Construction and Working of 4-stroke SI & CI engine, Differentiate SI and CI engines.	**32**	Explain with suitable sketches the working of a four-stroke CI engine.	2021-22. 2020-21
CO2	**10**	IC Engine terminology, Construction and Working of 4-stroke SI & CI engine, Differentiate SI and CI engines.	**33**	Compare the relative advantages and disadvantages of S.I. and C.I. engines.	2021-22

CO2	**11**	Construction and Working of two stroke SI & CI engine, Scavenging process, Differentiate 2 stroke and 4 stroke IC engine	**34**	Explain with suitable sketches the working of a Two-stroke SI engine.	2020-21
CO2	**11**	Construction and Working of two stroke SI & CI engine, Scavenging process, Differentiate 2 stroke and 4 stroke IC engine	**35**	Explain with suitable sketches the working of a Two-stroke CI engine.	
CO2	**11**	Construction and Working of two stroke SI & CI engine, Scavenging process, Differentiate 2 stroke and 4 stroke IC engine	**36**	Compare the relative advantages and disadvantages of four-stroke and two-stroke cycle engines.	2021-22
CO2	**11**	Construction and Working of two stroke SI & CI engine, Scavenging process, Differentiate 2 stroke and 4 stroke IC engine	**37**	What is the scavenging process?	2022-23, 2021-22, 2020-21
CO2	**11**	Construction and Working of two stroke SI & CI engine, Scavenging process, Differentiate 2 stroke and 4 stroke IC engine	**38**	Draw p-v and T-S diagram for Otto and diesel cycles.	2021-22
CO2	**12**	Introduction to electric vehicles, advantages and disadvantages	**39**	What is electric vehicle? What are the main components of electric vehicle? **OR** Discuss the working principle of an electric vehicle. What are the major demerits of these vehicles?	2022-23
CO2	**12**	Introduction to electric vehicles, advantages and disadvantages	**40**	Write the advantages and disadvantages of Electric Vehicles.	
CO2	**13**	EV Batteries and chargers	**41**	Explain different types of batteries and chargers required for a electric vehicle.	
CO2	**14**	EV Drives, Transmission and power device	**42**	Write short notes on- (i) EV Transmission system (ii) EV Power devices	
CO2	**15**	Introduction to Hybrid electric vehicles(HEV), HEV drive train, advantages and disadvantages, comparison	**43**	What are hybrid electric vehicles (HEV)? Explain different drive train components of HEV.	2022-23
CO2	**15**	Introduction to Hybrid electric vehicles(HEV), HEV drive train, advantages and disadvantages, comparison	**44**	Compare the relative advantages and disadvantages among IC engine, Electric vehicle and Hybrid vehicles.	

CO3	**16**	Refrigeration: meaning and its applications, unit of refrigeration, methods of refrigeration.	**45**	Define refrigeration and it applications in different fields.	
CO3	**16**	Refrigeration: meaning and its applications, unit of refrigeration, methods of refrigeration.	**46**	What is refrigerant? Discuss the classification of refrigerant.	
CO3	**16**	Refrigeration: meaning and its applications, unit of refrigeration, methods of refrigeration.	**47**	Write the short notes on ozone depletion and global warming.	
CO3	**16**	Refrigeration: meaning and its applications, unit of refrigeration, methods of refrigeration.	**48**	Give the name of any four environment friendly refrigerants.	
CO3	**16**	Refrigeration: meaning and its applications, unit of refrigeration, methods of refrigeration.	**49**	Explain the term 1 tonne of refrigeration.	2022-23
CO3	**17**	VCRS method	**50**	What are the different methods of refrigeration? Explain vapour compression refrigeration system(VCRS) in details. **OR** Explain the working of vapour compression refrigeration system by T-S diagram with related block diagram.	2021-22
CO3	**18**	Concept of Refrigerator and Heat pump, Coefficient of performance(COP).	**51**	What is the difference between a refrigerator and a heat pump?	
CO3	**18**	Concept of Refrigerator and Heat pump, Coefficient of performance(COP).	**52**	Define the coefficient of performance of a refrigerator and heat pump in words. Can it be greater than unity? **OR** Define coefficient of performance (COP) for a refrigeration system. Why do we express the performance in terms of COP instead of efficiency? Also, compare the COPs of a refrigerator and a heat pump.	2022-23, 2020-21
CO3	**18**	Concept of Refrigerator and Heat pump, Coefficient of performance(COP).	**53**	Derive the relation between the COP of refrigerator and heat pump.	
CO3	**19**	Construction and Working of domestic refrigerator.	**54**	Draw the neat diagram of a domestic refrigerator, showing its various parts. Explain its working also. **OR**	2022-23, 2021-22, 2020-21

				Explain the basic vapor compression cycle and describe the working of a domestic refrigerator	
CO3	**20**	Formula based numerical problems on cooling load.	**55**	The food compartment of a refrigerator is maintained at 4°C by removing heat from it at a rate of 360 kJ/min. If the required power input to the refrigerator is 2 kW, determine (a) the COP of the refrigerator and (b) the rate of heat rejection to the room	
CO3	**20**	Formula based numerical problems on cooling load.	**56**	A heat pump has a COP of 1.7. Determine the heat transferred to and from this heat pump when 50 kJ of work is supplied.	
CO3	**20**	Formula based numerical problems on cooling load.	**57**	A domestic food freezer maintains a temperature of – 15°C. The ambient air temperature is 30°C. If heat leaks into the freezer at the continuous rate of 1.75 kJ/s what is the least power necessary to pump this heat out continuously?	
CO3	**20**	Formula based numerical problems on cooling load.	**58**	Find the co-efficient of performance and heat transfer rate in the condenser of a refrigerator in kJ/h which has a refrigeration capacity of 12000 kJ/h when power input is 0.75 kW.	
CO3	**20**	Formula based numerical problems on cooling load.	**59**	A fish freezing plant requires 40 tons of refrigeration. The freezing temperature is – 35 °C while the ambient temperature is 30°C. If the performance of the plant is 20 % of the theoretical cycle working within the same temperature limits, calculate the power required.	
CO3	**21**	Air-Conditioning: meaning and applications, Atmospheric air, Dry Air, Wet air.	**60**	Define the term 'air-conditioning'**.** What are the different applications of air- conditioning?	
CO3	**21**	Air-Conditioning: meaning and applications, Atmospheric air, Dry Air, Wet air.	**61**	Define the following (i) Atmospheric air (ii) Dry Air (iii) Wet air	
CO3	**21**	Air-Conditioning: meaning and applications, Atmospheric air, Dry Air, Wet air.	**62**	Enumerate the main parts of the equipment in the air-conditioning cycle.	2021-22
CO3	**22**	Specific and relative humidity, Psychrometry: dry bulb, wet bulb, and dew point temperatures.	**63**	Define the following (i) Saturated air (ii) specific humidity (iii) relative humidity	

CO3	**22**	Specific and relative humidity, Psychrometry: dry bulb, wet bulb, and dew point temperatures.	**64**	Define the following (i) Dry Bulb Temperature (ii) Wet Bulb Temperature (iii) Dew point Temperature	2022-23
CO3	**23**	Construction and working of window air conditioner, Comfort conditions	**65**	With the help of neat sketch describe the working of window type air-conditioner. **OR** Explain basic components and working of Window Air Conditioner.	2021-22, 2020-21
CO3	**23**	Construction and working of window air conditioner, Comfort conditions	**66**	Explain the factor which affects human comfort. What are the conditions for comfort air conditioning?	
CO4	**24**	Fluids and their properties: pressure, density, specific weight, Specific gravity with basic numerical. Dynamic and kinematic viscosity	**67**	Define fluid and what is difference between gas and liquid?	
CO4	**24**	Fluids and their properties: pressure, density, specific weight, Specific gravity with basic numerical. Dynamic and kinematic viscosity	**68**	Define the following fluid properties: Density, weight density, Specific volume and specific gravity of a Fluid. **OR** Write any four properties of fluid.	2021-22
CO4	**24**	Fluids and their properties: pressure, density, specific weight, Specific gravity with basic numerical. Dynamic and kinematic viscosity	**69**	What is the difference between dynamic viscosity and kinematic viscosity? State their units of measurement. **OR** Define viscosity. How viscosity of liquids and gases varies with temperature	
CO4	**24**	Fluids and their properties: pressure, density, specific weight, Specific gravity with basic numerical. Dynamic and kinematic viscosity	**70**	Calculate the density, specific weight and weight of one liter of petrol of specific gravity = 0.7	
CO4	**24**	Fluids and their properties: pressure, density, specific weight, Specific gravity with basic numerical. Dynamic and kinematic viscosity	**71**	Calculate the specific weight, density and specific gravity of one liter of a liquid which weights 7 Newton.	2022-23
CO4	**24**	Fluids and their properties: pressure, density, specific weight, Specific gravity with basic numerical. Dynamic and kinematic viscosity	**72**	Define pressure. What do you understand by atmospheric pressure? **OR** What is the difference between atmospheric pressure, gauge	2021-22

				pressure and absolute pressure?	
CO4	**24**	Fluids and their properties: pressure, density, specific weight, Specific gravity with basic numerical. Dynamic and kinematic viscosity	**73**	Differentiate between the absolute, gage and vacuum pressure. A manometer, shown in figure, is used to measure the pressure of a gas in a tank. The fluid used has a specific gravity of 0.85, and the manometer column height is 55 cm. If the local atmospheric pressure is 96 kPa, determine the absolute pressure within the tank. 	2022-23
CO4	**24**	Fluids and their properties: pressure, density, specific weight, Specific gravity with basic numerical. Dynamic and kinematic viscosity	**74**	What is the absolute pressure experienced by a pressure sensor, if the atmospheric pressure of a fluid is 2 atm, gauge pressure is 5 atm and differential pressure is 3 atm?	2021-22
CO4	**25**	Newton's law of viscosity, Types of fluids: Newtonian and Non-Newtonian fluid	**75**	State the Newton's law of viscosity.	
CO4	**25**	Newton's law of viscosity, Types of fluids: Newtonian and Non-Newtonian fluid	**76**	What are Newtonian and non-Newtonian fluids?	2020-21
CO4	**25**	Newton's law of viscosity, Types of fluids: Newtonian and Non-Newtonian fluid	**77**	Explain different types of fluid. Also differentiate between Real and Ideal fluids.	
CO4	**25**	Newton's law of viscosity, Types of fluids: Newtonian and Non-Newtonian fluid	**78**	Plate 0.025 mm distance from a fixed plate, move at 60 cm/second and requires a force of 2 Newton per unit area (2 N/m^2) to maintain this is speed determines the fluid viscosity between the plates.	
CO4	**26**	Pascal's Law and its applications, Continuity Equation basic numerical problems.	**79**	Explain Pascal's law with help of a neat sketch. What are its practical applications?	2022-23, 2021-22

CO4	**26**	Pascal's Law and its applications, Continuity Equation basic numerical problems.	**80**	Hydraulic press has the ram of 30 cm diameter and a plunger of 4.5 cm diameter. Find the weight lifted by the hydraulic press when the force applied at the plunger is 500 N.	
CO4	**26**	Pascal's Law and its applications, Continuity Equation basic numerical problems.	**81**	Hydraulic press has a ram of 20 cm diameter and a plunger of 3 cm diameter. It is used for lifting a weight of 30 N. Find the force required at the plunger.	
CO4	**26**	Pascal's Law and its applications, Continuity Equation basic numerical problems.	**82**	The small piston of a hydraulic lift has an area of 0.20 m^2 . A car weighing 1.2 x 10^4 N sits on a rack mounted on the large piston. The large piston has an area of 0.90 m^2 . How large force must be applied to the small piston to support the car	2022-23
CO4	**26**	Pascal's Law and its applications, Continuity Equation basic numerical problems.	**83**	What is conservation of mass principle? Derive the continuity equation for incompressible and compressible fluids.	
CO4	**26**	Pascal's Law and its applications, Continuity Equation basic numerical problems.	**84**	The diameter of a pipe at a section 1 and 2 are 10 cm and 15 cm, respectively. Find the discharge through the pipe if the velocity of water flowing through a the pipe at section 1 is 5 m/s. Determine also the velocity at section 2.	
CO4	**26**	Pascal's Law and its applications, Continuity Equation basic numerical problems.	**85**	30 cm diameter pipe conveying water, branches into two pipe of diameter 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 determine the velocity in 15 cm pipe if the average velocity in 20 cm diameter pipe is 2 m/s.	
CO4	**27**	Hydraulic machines: general layout of hydro-electric power plant, classification of turbines.	**86**	What are hydraulic turbines? How are they classified? Write their advantages and disadvantages?	2020-21
CO4	**27**	Hydraulic machines: general layout of hydro-electric power plant, classification of turbines.	**87**	Differentiate between impulse and reaction turbines. **OR** What is the working principle of an impulse turbine?	2022-23
CO4	**28**	Construction and working of Impulse and Reaction turbine.	**88**	Explain the construction and working of impulse (Pelton) turbine with neat sketch.	2021-22
CO4	**28**	Construction and working of Impulse and Reaction turbine.	**89**	Explain the construction and working of reaction(Francis) turbine with neat sketch.	

CO4	**29**	Working principles and classification of hydraulic pump(Centrifugal and reciprocating)	**90**	What are hydraulic pump? Enlist the various types of pumps.	2020-21
CO4	**29**	Working principles and classification of hydraulic pump(Centrifugal and reciprocating)	**91**	Explain the construction and working of centrifugal pump with neat sketch.	2021-22
CO4	**29**	Working principles and classification of hydraulic pump(Centrifugal and reciprocating)	**92**	Explain the construction and working of reciprocating pump with neat sketch. **OR** Describe the working principle of a reciprocating pump. Why are these pumps called positive displacement pump.	2022-23, 2021-22
CO4	**29**	Working principles and classification of hydraulic pump(Centrifugal and reciprocating)	**93**	Differentiate between centrifugal and reciprocating pump.	
CO4	**30**	Working of hydraulic lift.	**94**	With the help of neat sketch, the working of hydraulic lift.	2021-22
CO5	**31**	Concept of Measurement, Error in measurements, Calibration, Accuracy, Precision and Resolution	**95**	What do you mean by measurement? What are the different methods of measurement?	
CO5	**31**	Concept of Measurement, Error in measurements, Calibration, Accuracy, Precision and Resolution	**96**	Explain the term error in measurement. What are different types of Error? OR Explain the difference between systematic and random errors. What are the typical sources of these two types of error?	2021-22
CO5	**31**	Concept of Measurement, Error in measurements, Calibration, Accuracy, Precision and Resolution	**97**	What do you mean by calibration of an instrument? Why it is required? Explain.	
CO5	**31**	Concept of Measurement, Error in measurements, Calibration, Accuracy, Precision and Resolution	**98**	Differentiate between accuracy and precision?	2022-23
CO5	**31**	Concept of Measurement, Error in measurements, Calibration, Accuracy, Precision and Resolution	**99**	Define range and span of a measuring instrument. Also differentiate between resolution and threshold value.	

CO5	**32**	Measurements of pressure, Bourdon Tube Pressure Gauge	**100**	Briefly explain a Bourbon tube-based pressure measurement device. **OR** Define pressure. Write the classification of pressure measurement instruments. Explain the working of bourdon tube pressure gauge with neat sketch.	2022-23, 2021-22
CO5	**32**	Measurements of pressure, Bourdon Tube Pressure Gauge	**101**	What are U-tube manometers. A simple U-tube manometer containing mercury is connected to a pipe in which a fluid of sp. gravity 0.8 and having vaccum pressure is flowing. The another end of manometer is open to atmosphere. Find the vaccum pressure in pipe, if the difference of mercury level in the two limbs is 40cm and the height of the fluid in the left tube from the centre of pipe is 15cm below.	
CO5	**33**	Temperature Measurements	**102**	Explain the construction and working of optical pyrometer with neat diagram.	
CO5	**33**	Temperature Measurements	**103**	Explain the different methods for temperature measurement. Discuss the construction and working of thermocouple? **OR** Explain the Seebeck effect and the working principle of thermocouples with help of a neat sketch. Also discuss their advantages and disadvantages.	2022-23
CO5	**34**	Measurement of Mass flow rate, strain, Force and Torque	**104**	Discuss the types of flow measuring devices and explain any one in detail?	
CO5	**34**	Measurement of Mass flow rate, strain, Force and Torque	**105**	What is a strain gauge? Explain the different methods to calculate strain? **OR** Differentiate between bonded and unbonded strain gauges systems.	2022-23
CO5	**34**	Measurement of Mass flow rate, strain, Force and Torque	**106**	Explain, with a neat sketch, determination of force using a proving ring.	
CO5	**34**	Measurement of Mass flow rate, strain, Force and Torque	**107**	Define torque? How torque is measured using prony brake dynamometer.	

CO5	**35**	Evolution, Scope, Advantages and disadvantages of Mechatronics, Industrial applications of Mechatronics and its scope	**108**	Define Mechatronics. Write the advantages, disadvantages and application of Mechatronics. **OR** Discuss the merits and demerits of mechatronics systems. Also Discuss the scope of mechatronics for engineers.	2022-23 2020-21
CO5	**35**	Evolution, Scope, Advantages and disadvantages of Mechatronics, Industrial applications of Mechatronics and its scope	**109**	Discuss the various key elements of a mechatronics system and write any four-mechatronics system.	2021-22
CO5	**35**	Evolution, Scope, Advantages and disadvantages of Mechatronics, Industrial applications of Mechatronics and its scope	**110**	How mechatronics evolved over the period of time?	
CO5	**36**	Introduction to autotronics, bionics, and avionics and their applications.	**111**	What are Autotronics, bionics and avionics? Write their applications. **OR** Differentiate between Autotronics, Bionics, and Avionics along with their applications.	2022-23 2020-21
CO5	**36**	Introduction to autotronics, bionics, and avionics and their applications.	**112**	Define the term autotronics. What is the aim of autotronics?	
CO5	**36**	Introduction to autotronics, bionics, and avionics and their applications.	**113**	Write the short notes on bionics implants.	
CO5	**36**	Introduction to autotronics, bionics, and avionics and their applications.	**114**	Explain any four autotronics systems.	
CO5	**37**	Sensors and Transducers: Types of sensors, types of transducers, various characteristics of sensors and transducers	**115**	What are sensors and transducers? Enumerate the various types of sensors and transducers. **OR** Classify transducers by function, performance and on the output basis.	2022-23 2021-22 2020-21
CO5	**37**	Sensors and Transducers: Types of sensors, types of transducers, various characteristics of sensors and transducers	**116**	Discuss on the static and dynamic characteristics transducers	
CO5	**38**	Mechanical Actuation systems	**117**	Explain different types of “Mechanical Actuation system” based on power inputs. **OR**	2021-22

				Write any four mechanical actuators.	
CO5	**38**	Mechanical Actuation systems	**118**	Define Kinematic chain with the help of diagram. Define the four bar chain and its inversions.	
CO5	**38**	Mechanical Actuation systems	**119**	What is the CAM? Define its function and application. What are the types of CAM and followers?	
CO5	**38**	Mechanical Actuation systems	**120**	Explain (i)Train Ratchet -pawl and (ii) Bearings (iii) Belt drive	
CO5	**38**	Mechanical Actuation systems	**121**	What are gears? Describe the different types of gears with diagram. Define gear ratio and gear train.	
CO5	**39**	Overview: Pressure Control Valves, Cylinders, Direction Control Valves, Rotary Actuators	**122**	What are control valves? Explain direction control valve and pressure control valve in brief.	2020-21
CO5	**39**	Overview: Pressure Control Valves, Cylinders, Direction Control Valves, Rotary Actuators	**123**	Differentiate between Hydraulic system and Pneumatic system.	2021-22
CO5	**39**	Overview: Pressure Control Valves, Cylinders, Direction Control Valves, Rotary Actuators	**124**	What are actuators? Explain various types of actuators.	
CO5	**40**	Accumulators and their applications, Pneumatic Sequencing Problems.	**125**	Describe accumulator and its function?	2021-22