INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

ELECTRICAL AND ELECTRONICS ENGINEERING

TUTORIAL QUESTION BANK

Course Name	:	**FLUID MECHANICS AND HYDRAULIC MACHINERY**
Course Code	:	A30102
Class	:	II-I
Branch	:	**ELECTRICAL AND ELECTRONICS ENGINEERING**
Year	:	2016 – 2017
Course Coordinator		Mr. G Sarat Raju, Assistant Professor.
Course Faculty	:	Mr. G Sarat Raju, Assistant Professor.

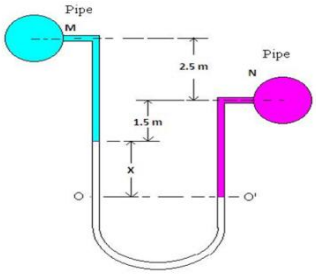
OBJECTIVES

To meet the challenge of ensuring excellence in engineering education, the issue of quality needs to be addressed, debated and taken forward in a systematic manner. Accreditation is the principal means of quality assurance in higher education. The major emphasis of accreditation process is to measure the outcomes of the program that is being accredited.

In line with this, Faculty of Institute of Aeronautical Engineering, Hyderabad has taken a lead in incorporating philosophy of outcome based education in the process of problem solving and career development. So, all students of the institute should understand the depth and approach of course to be taught through this question bank, which will enhance learner's learning process.

S. No.	Question	Blooms Taxonomy Level	Course Outcomes
	UNIT-I **Fluid Statics and Fluid Kinematics**		
Part - A (Short Answer Questions)			
1	Define mass density and state its SI units	Remembering	1
2	Define Weight density and state its SI units	Remembering	1
3	Define Specific volume and state its SI units	Remembering	1
4	Define specific gravity of a fluid and state its SI units	Remembering	1
5	Differentiate between Liquids and gases	Analyzing	1
6	Differentiate between Real fluids and ideal fluids	Analyzing	1
7	Differentiate between Specific weight and specific volume of a fluid.	Analyzing	1
8	Differentiate between Newtonian and non-newtonian fluids	Analyzing	1
9	Define and explain Newton's law of viscosity.	Remembering	1
10	Why does the viscosity of a gas increases with the increases in temperature while that of a liquid decreases with increase in temperature?	Evaluating	1
11	One litre of crude oil weighs 9.6N.calculate its specific weight, density and specific gravity.	Applying	1
12	Define vapor pressure.	Remembering	1
14	Define Cavation	Remembering	1

S. No.	Question	Blooms Taxonomy Level	Course Outcomes
15	Define surface tension.	Remembering	1
16	Define the property of capillarity.	Remembering	1
17	Define kinematic viscosity and state its units.	Remembering	1
18	Differentiate between compressible and in compressible fluids.	Remembering	1
19	Explain differential manometer.	Remembering	1
20	Explain stream line flow pattern.	Understanding	2
21	Explain path line flow pattern.	Understanding	2
22	Explain streak line flow pattern.	Understanding	2
23	Explain stream tube.	Understanding	2
24	Differentiate steady and unsteady flow.	Analyzing	2
25	Differentiate uniform and non uniform flow.	Analyzing	2
26	Differentiate laminar and turbulent flow.	Analyzing	2
27	Differentiate rotational and irrotational flow.	Analyzing	2
Part – B (Long Answer Questions)			
1	Explain in detail mass density, write its units and explain the effect of temperature and pressure on mass density	Remembering, Understanding	1
2	Explain in detail weight density, write its units and explain the effect of temperature and pressure on weight density	Remembering, Understanding	1
3	Explain with a neat sketch the viscosity, newton's law of viscosity, and the effect of temperature and pressure on viscosity	Remembering, Understanding	1
4	Explain in detail the kinematic and dynamic viscosity and derive the relation between them.	Remembering, Understanding	1
5	Explain in detail the Vapor pressure, surface tension.	Understanding	1
6	Explain with neat sketch atmospheric, gauge and vacuum pressure	Understanding	1
7	Classify the patterns of flow and Explain in detail with neat sketch the Stream line flow	Remembering, Understanding	2
8	Classify the patterns of flow and Explain in detail the path line flow and stream tube	Remembering, Understanding	2
9	Classify and Explain different types of forces acting on a fluid flow	Remembering, Understanding	2
10	State the principle of continuity equation. Derive the 1-D continuity equation for a fluid flow along a stream line flow	Remembering, Understanding	2
11	Derive Euler's equation for a fluid flow	Remembering, Understanding	2
12	Write different types of flows and Explain in detail Steady flow	Remembering, Understanding	2
13	Write different types of flows and Explain in detail Laminar flow	Remembering, Understanding	2
14	Write different types of flows and Explain in detail Turbulent flow	Remembering, Understanding	2
15	Write different types of flows and Explain in rotational flow	Remembering, Understanding	2
16	Write different types of flows and Explain in detail irrotational flow	Remembering, Understanding	2
Part – C (Problem solving and Analytical Questions)			
1	The velocity distribution for flow over a flat plate is given by $u=3/2\ y-y^{3/2}$. Where u is the point velocity in metre per second at a distance y metre above the plate. Determine the shear stress at y=9cm. Assume	Analyzing, Evaluating	1

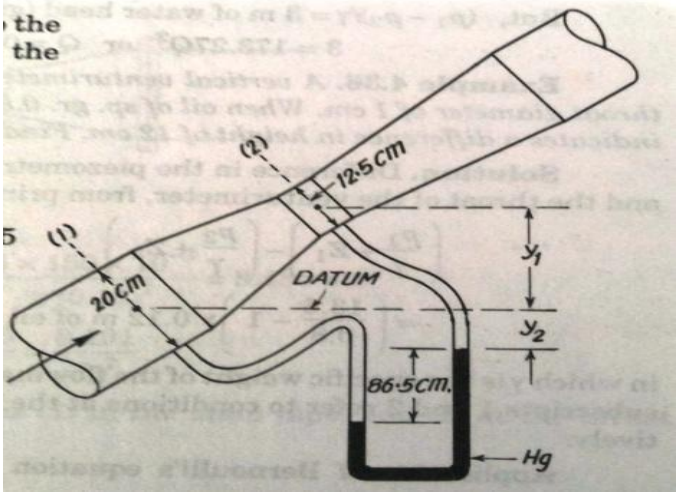
S. No.	Question	Blooms Taxonomy Level	Course Outcomes
	dynamic viscosity as 8 poise.		
2	A plate, 0.025 mm distant form a fixed plate, moves at 50 cm/s and requires a force of 1.471 N/m^2 to maintain this speed. Determine the fluid viscosity between the plates in the poise.	Analyzing, Evaluating	1
3	Find the kinematic viscosity of an oil having density 980kg/m^2 .when at a certain point in the oil, the shear stress is 0.25N/m^2 and the velocity gradient 0.3/s.	Analyzing, Evaluating	1
4	Figure shows a differential manometer connected at two points A & B at A air pressure is 100 KN/m^2. Determine the absolute pressure at B	Analyzing, Evaluating	1
5	An inverted u-tube manometer is connected to two horizontal pipes A & B through which water is flowing. The vertical distance between the axes of these points is 30 cm. When an oil of sp. gravity 0.8 is used as a gauge fluid, the vertical heights of water columns in the two limbs of the inverted manometer (when measured from the respective center lines of the pipes) are found to be same and equal to 35 cm. Determine the difference of pressure between the pipes. 	Analyzing, Evaluating	1
6	The pressure 3 meter below the free surface of a liquid is 13.72 kN/m^2. Determine its specific weight	Applying	1
7	An oil of specific gravity 0.80 is under a pressure of 137.2 kN/m^2. What is the pressure head expressed in meters of oil?	Applying	1
8	An oil of specific gravity 0.80 is under a pressure of 137.2 kN/m^2. What is the pressure head expressed in meters of water?	Applying	1
9	Two pipes are connected with an inverted U-tube differential manometer. Pipe A to the left limb and Pipe B to the right limb. Water is flowing through the pipes. The water level in the left limb connected to pipe A is 165cm. The difference of water level in the two limbs is 25cm and the level in the right limb is lower than that of the left limb. The difference of the level between two pipe centers is 50cm. Manometric fluid is the oil with specific gravity 0.9. Sketch the set up and determine the pressure difference between the pipes A and B.	Evaluating, Applying	1
10	The pressure 3 meter below the free surface of a liquid is 13.72 kN/m^2. Determine its specific weight	Applying	1

UNIT – II
Fluid Dynamics and Closed conduit flow
Part - A (Short Answer Questions)

S. No.	Question	Blooms Taxonomy Level	Course Outcomes
1	What are line forces?	Remembering	2

S. No.	Question	Blooms Taxonomy Level	Course Outcomes
2	What are body forces?	Remembering	2
3	What are surface forces?	Remembering	2
4	Write the assumptions of Bernoulli's equation	Remembering	2
5	What is the principle of Continuity equation	Remembering	2
6	What is the principle of Bernolli's equation	Remembering	2
7	What forces are included in Navier Stoke's equation?	Evaluating	2
8	What forces are included in Euler's equation?	Evaluating	2
9	What forces are included in Reynold's equation?	Evaluating	2
10	Write the condition of Reynold's number for Laminar boundary layer region	Remembering	3
11	What is the purpose of Pitot tube?	Remembering	3
12	What is total energy line (TEL)?	Remembering	3
13	What HGL?	Remembering	3
14	Write Darcy weisbach equation and chezyes formula.	Remembering	3
15	What is an Orifice?	Remembering	3
Part – B (Long Answer Questions)			
1	Derive Euler's equation for a fluid flow	Remembering, Understanding	2
2	State the principle and Derive Bernoulli's equation for a fluid flow	Remembering, Understanding	2
3	State the assumptions of Bernoulli's equation and list the applications of Bernoulli's equation	Remembering, Understanding	2
4	State and explain the momentum equation.	Remembering, Understanding	2
5	Apply momentum equation to a pipe bend and derive expressions for forces acting on it.	Remembering, Understanding	2
6	Derive Darcy-Weisbach eauation.	Evaluating	2
7	Explain various minor energy losses.	Understanding	2
8	Explain how to construct a hydraulic gradient and total energy line, with a neat sketch.	Understanding	2
9	Describe the working of a venture meter with a neat sketch.	Understanding	2
10	Describe the working of an orifice meter with a neat sketch.	Understanding	2
11	What will happen when the pipes are connected in series and in parallel?	Analyzing	2
12	Derive an expression for loss of head due to sudden enlargement	Evaluating	2
13	Derive an expression for loss of head due to sudden contraction	Evaluating	2
14	Describe the working of a pitot tube with a neat sketch.	Remembering, Understanding	2
15	Explain in detail Reynold's experiment with neat sketch	Remembering, Understanding	2
16	Derive the expression for the Coefficient of discharge through a Venturi meter.	Evaluating	2
17	Derive the expression for the Coefficient of discharge through an orifice meter	Evaluating	2
Part – C (Problem solving and Analytical Questions)			
1	A pipe 250m long has a slope of 1 in 100 and tapers from 1000mm diameter at higher end to 500mm at lower end. If 5000litres of water is flowing through the pipe per minute and the pressure of water at	Analyzing, Evaluating	2

S. No.	Question	Blooms Taxonomy Level	Course Outcomes
	higher end is 1 kg/cm^2. Find the pressure at the lower end		
2	At a certain section A of a pipe line carrying water, the diameter is 1 m. the pressure is 98.1 kN/m^2 and the velocity is 3m/s. At another section B which is 2m higher than A, the diameter is 0.7m and the pressure is 59.2 kN/m^2. What is the direction of flow	Analyzing, Evaluating	2
3	Water flows at the rate of 0.71m^3/s through the pipe whose inlet is 90cm dia and out let is 60cm dia. If the pressure intensity at the centre line of the 90cm section is 9810 N/m^2 what will be the centre line pressure in the 60cm section?	Analyzing, Evaluating	2
4	Water flows at the rate of 0.71m^3/s through the pipe whose inlet is 90cm dia and out let is 60cm dia. If the pressure intensity at the centre line of the 90cm section is 9810 N/m^2 What force will be required to produce the change in momentum of water as it passes through this transition?	Analyzing, Evaluating	2
5	A pipe of diameter 20 cm and length 2000 m connects two reservoirs, having difference of water levels as 20 m. Determine the discharge through the pipe. If an additional pipe of diameter 20 cm and length 1200 m is attached to the last 1200 m length of the existing pipe, calculate the increase in the discharge. Take f = 0.015 and neglect minor losses.	Analyzing, Evaluating	2
6	A horizontal pipe line 40 m long is connected to a water tank at one end and discharges freely into the atmosphere at the other end. For the first 25 m of its length from the tank is 150 mm diameter and its diameter is suddenly enlarged to 300 mm. The height of water level in the tank is 8 m above the centre of the pipe. Considering all losses of head which occur, determine the rate of flow. Take f = 0.01 for both sections of the pipe, also draw HGL and TEL.	Analyzing, Evaluating	2
7	An orifice meter with orifice diameter 15 cm is inserted in a pipe of 30 cm diameter. The pressure difference measured by a mercury oil differential manometer on the two sides of the orifice meter gives a reading of 50 cm of mercury. Find the rate of flow of oil of specific gravity 0.9 when the co-efficient of discharge of the meter = 0.64.	Analyzing, Evaluating	2
8	For a linear distribution of velocity in the boundary layer on a flat plate, find the value of ratio of displacement thickness to momentum thickness.	Analyzing, Evaluating	2
9	A 20cm water pipe has in it a venturimeter of throat diameter 12.5cm as shown in the figure, which is connected to a mercury manometer showing a difference of 86.5cm. find the velocity in the throat and the discharge.	Analyzing, Evaluating	2

S. No.	Question	Blooms Taxonomy Level	Course Outcomes
			
10.	A pipe line carries oil of specific gravity 0.83 at a velocity of 2m/s through a 20cm pipe. At another section the diameter is 15cm. Find the velocity at this section and the mass rate of flow	Analyzing, Evaluating	2
	UNIT – III **Basics of Turbo Machinery and Hydroelectric power stations**		
	Part – A (Short Answer Questions)		
1	What is the force exerted by jet on flat fixed plate.	Remembering	3
2	What is the force exerted by jet on curved fixed plate.	Remembering	3
3	What is the force exerted by jet on curved moving plate.	Remembering	3
4	What is the force exerted by jet on flat moving plate.	Remembering	3
5	What is the force exerted by jet when it is striking centrally of a symmetrical curved plate.	Remembering	3
6	What is the force exerted by jet when it is striking at tip of symmetrical curved plate.	Remembering	3
7	What is the force exerted by jet when it is striking at tip of unsymmetrical curved plate.	Remembering	3
8	Draw velocity triangles when jet is striking at tip of symmetrical curved plate.	Analyzing	3
9	Draw velocity triangles when jet is striking at tip of unsymmetrical curved plate.	Analyzing	3
10	What is the work done and efficiency when the jet is striking at the tip symmetrical curved vane.	Remembering	3
11	What is the work done and efficiency when the jet is striking at the tip unsymmetrical curved vane.	Remembering	3
12	What is the efficiency when the jet is striking number of radial curved vanes?	Remembering	3
13	What is mass curve?	Remembering	3
14	What is storage?	Remembering	3
15	What is pondage?	Remembering	3
16	Differentiate gross head and net head?	Remembering	3
17	What is the use of mass curve?	Remembering	3
18	What are base load points?	Remembering	3
	Part – B (Long Answer Questions)		
1	Draw a general layout of a Hydro electric power plant and explain it?	Analyzing	3

S. No.	Question	Blooms Taxonomy Level	Course Outcomes
2	Explain different elements of Hydro Electric power stations?	Understanding	3
3	How can you draw the mass curve?	Analyzing	3
4	Explain different types of Hydro electric power plants	Understanding	3
5	What are the various efficiencies of Hydraulic Turbines?	Remembering	3
6	Explain pumped storage plants	Understanding	3
7	A jet of water of diameter 60mm moving with a velocity of 40 m/sec, strikes a curved fixed symmetrical plate at the centre. Determine the force exerted by the jet of water in the direction of the jet, if the jet is deflected by an angle of 160 degrees at the outlet of the curved plate.	Evaluating	3
8	Derive an expression for work done/sec and efficiency when the jet of water striking tangentially at the tip of the vane of an un symmetrical curved vane.	Evaluating	3
9	Derive work done and efficiency when the jet of water striking tangentially of a radial curved vanes.	Evaluating	3
10	Explain the concept of pumped storage plants.	Understanding	3
11	Two turbo-generators each of capacity 25000kW have been installed at a hydel power station. During a certain period the load on the hydel plant varies from 15000kW to 4000kW. Calculate i. The total installed capacity, ii. The load factor, iii. The plant factor and iv. The utilization factor	Creating	3
12	Derive an expression for the force exerted by the jet of water on the moving flat vanes	Evaluating	3,4
13	Derive an expression for the force exerted by the jet of water on the moving flat inclined vanes	Evaluating	3,4
14	Derive an expression for the force exerted by the jet of water on the curved moving vane when the jet strikes at the tip of the symmetrical vane	Evaluating	3,4
15	Derive an expression for the force exerted by the jet of water on the curved moving vane when the jet strikes at the tip of the un symmetrical vane	Evaluating	3,4
Part – C (Problem solving and Analytical Questions)			
1	A jet of water having a velocity of 35m/s impinges on a series of vanes moving with a velocity of 20m/s the jet makes an angle of 30^0 to the director of motion of vanes. When entering and leaves at angle of 120^0 draw the inlet and outlet velocity triangles and find a. The angles of vane tip so that water enters and leaves without shock. b. The work done per unit weight of water c. Efficiency	Evaluating	3,4
2	A jet of water of diameter 50mm, having a vel of 20m/s. strikes a curved vane which moving a velocity of 10m/s in the direction of the jet. The jet leaves the vane at an angle of 60^0 to the direction of motion of vane at outlet. Determine. i. The force exerted by the jet on the vane in the dirn of motion ii. WD/sec by the jet.	Applying	3,4
3	A jet of water 75 mm in diameter having velocity of 20 m/s strikes a series of the flat plates arranged around the periphery of a wheel such that each plate appears successively before the jet. If the plates are moving at a velocity of 5 m/s, calculate the force exerted by the jet on the plate, the work done per second on the plate and the efficiency of the jet.	Evaluating	3
4	A jet of water 50 mm in diameter issues with a velocity of 10m/sec	Applying	3

S. No.	Question	Blooms Taxonomy Level	Course Outcomes
	and impinges normally on a stationary flat plate which moves in forward motion. Determine the force exerted by the jet on the plate and the work done.		
5	A jet of water having a velocity of 15 m/s strikes a curved vane which is moving with a velocity of 5 m/s. The vane is symmetrical and it is so shaped that the jet is reflected through 120 $^{0.}$ Find the angle of the jet at inlet of the vane so that there is no shock. What is the absolute velocity of the jet at out let in magnitude and directions and the work done pet unit weight of water.	Applying	3
UNIT – IV **Hydraulic Turbines and Performance of hydraulic turbines** **Part – A (Short Answer Questions)**			
1	Differentiate impulse and reaction turbines.	Analyzing	4
2	What is specific speed?	Remembering	4
3	Mention different specific speeds for different turbines.	Analyzing	4
4	What is the purpose of draft tube?	Remembering	4
5	What is mass curve?	Remembering	4
6	Differentiate axial and radial flow turbines.	understanding	4
7	What are the different heads in turbines?	Analyzing	4
8	How governing of a turbine takes place?	Understanding	4
9	How cavitation occurs?	Understanding	4
10	What are unit quantities?	Remembering	4
11	What is overall efficiency of turbine?	Remembering	4
12	When do you use pelton wheel turbine?	Applying	4
13	Name different types of draft tubes.	Remembering	4
14	What is water hammer?	Understanding	4
15	Draw O.C curves for turbines	Applying	4
16	What is the force exerted by the jet of water on flat moving inclined plate?	Applying	4
17	Write formulae for unit speed and unit power.	Remembering	4
18	Draw the velocity triangles in the jet of water striking at the tip of unsymmetrical moving curved vane .	Applying	4
19	What is the formula for draft tube efficiency?	Remembering	4
20	What is the efficiency of radial curved vane ?	Remembering	4
Part – B (Long Answer Questions)			
1	Classify the turbine	Understanding	4
2	Explain the working principles of Pelton wheel turbine and derive expression for efficiency	Understanding	4
3	Explain the working principles of Kaplan turbine and derive expression for efficiency	understanding	
4	How to govern the impulse turbines? Explain with a neat sketch.	Evaluating	4
5	Explain the working principles of Francis turbine and derive expression for efficiency	understanding	
6	A turbine develops 9000 KW when running at 100 rpm. The head on the turbine is 30 m. if the head on the turbine reduced to 18m, determine the speed and power developed by the turbine.	Creating	4
7	What is the necessity of a surge tank in turbines. Explain different types of surges with the aid of neat diagrams.	Remembering	4
8	A hydraulic turbine under a head of 25 metres develops 7260 kW running at 110 rpm. What is the specific speed of the turbine? What	Evaluating	4

S. No.	Question	Blooms Taxonomy Level	Course Outcomes
	types of turbine is this. Find also the normal speed and output if the head on the turbine is reduced to 20 m.		
9	Define unit Head, unit discharge and unit power of a turbine and derive the expressions for the same.	Remembering	4
10	What is the purpose of draft tube? Explain the different types of draft tubes	Understanding	4
11	What is governing of a turbine? Explain governing of the impulse turbine	Understanding	4
12	How can you draw the characteristics curves for turbines	Applying	4
13	How cavitation occurs in turbines what are the remedies for preventing cavitation		
14	What are unit quantities and explain them	Understanding	4
15	Derive an expression for the efficiency of draft tube		
Part – C (Problem solving and Analytical Questions)			
1	A Pelton wheel having a mean bucket diameter of 1.0 m is running at 1000 r.p.m. the side clearance angle is 150 and discharge through the nozzle is $0.1m^3/s$, determine power available at the nozzle and hydraulic efficiency of the turbine.	Creating	4
2	Two turbo-generators each of capacity 25000kW have been installed at a hydel power station. During a certain period the load on the hydel plant varies from 15000kW to 4000kW. Calculate v. The total installed capacity, vi. The load factor, vii. The plant factor and viii.The utilization factor	Creating	3
3	A jet of water of diameter 50mm, having a vel of 20m/s. strikes a curved vane which moving a velocity of 10m/s in the direction of the jet. The jet leaves the vane at an angle of 60^0 to the direction of motion of vane at outlet. Determine. iii. The force exerted by the jet on the vane in the dirn of motion iv. WD/sec by the jet.	Applying	3,4
4	A hydraulic turbine working under a head of 165 metres runs at 300 rpm, the discharge of the turbine being $0.60m^3/sec$. The overall efficiency of the turbine is 85%. Find the type of turbine.	Applying	4
5	A turbine is to operate under a head of 30 metres at 250 rpm. The discharge is $10.5m^3/sec$. if the efficiency is 85% determine i. Power generated ii. The specific speed of the turbine iii. Type of turbine iv. Performance under a head of 25 metres.	Creating	3,4
6	A turbine is to operate under a head of 25 mts at 200 rpm. The discharge is 9 cumec, if the efficiency is 90 %, determine the performance of the turbine under a head of 20 m.	Creating	3,4
7	A pelton wheel is revolving at a speed of 190 rpm and develops of 5150.25 kw. When working under a head of 220 m with an overall efficiency of 80%. Determine unit speed , unit discharge, unit power. The speed ratio is 0.47. Find the speed, discharge and power when this turbine is working under head of the 140 m.	Applying	4
UNIT – V Centrifugal pumps Part – A (Short Answer Questions)			
1	What is the function of pump?	Remembering	5
2	Draw the neat diagram of centrifugal pump.	Applying	5
3	What is static head?	Remembering	5

S. No.	Question	Blooms Taxonomy Level	Course Outcomes
4	What is Manometric head?	Remembering	5
5	Define specific speed for centrifugal pump?	Remembering	5
6	Draw the O.C curves for centrifugal pump.	Applying	5
7	Draw the Muschel curves for centrifugal pump.	Applying	5
8	How cavitation occurs in centrifugal pumps.	Understanding	5
9	What water hammer?	Understanding	5
10	What is NPSH?	Remembering	5
11	Name different efficiency of centrifugal pump	Remembering	5
12	What are the functions of multistage centrifugal pump?	Remembering	5
13	Define priming of centrifugal pump.	Understanding	5
14	How can you prevent cavitations?	Applying	5
15	Draw constant efficiency curves for centrifugal pump.	Applying	5
Part – B (Long Answer Questions)			
1	Derive an expression specific speed of a centrifugal pump.	Evaluating	5
2	Draw and explain characteristic curves for centrifugal pumps.	Applying	5
3	What will happen when the pumps are connected in series and parallel?	Analyzing	5
4	What is Cavitation? Explain how it is detected. What are the effects of Cavitation? Explain how cavitation can be avoided.	Remembering	
5	Draw and explain centrifugal pump working with neat sketch.	Applying	5
6	Explain different efficiencies of centrifugal pump.	Understanding	5
7	How number of vanes effects head and efficiency of a centrifugal pump.	Applying	5
8	Classify the centrifugal pump	Undersstanding	
9	Derive an expression specific speed of a centrifugal pump.	Evaluating	5
10	Draw and explain characteristic curves for centrifugal pumps.	Applying	5
11	What will happen when the pumps are connected in series and parallel?	Analyzing	5
12	Explain different efficiencies of centrifugal pump	Applying	5
13	Explain different heads of centrifugal pump	Analyzing	5
14	What are the main parts of centrifugal pump and explain with neat sketch	Understanding	5
15	Explain the importance of NPSH	Applying	5
Part – C (Problem solving and Analytical Questions)			
1	A centrifugal pump is to discharge 0.118 m^3/s at a speed of 1450 rpm against a head of 25 m. The impeller diameter is 250 mm, its width at outlet is 50 mm and manometric efficiency is 75%. Determine the vane angle at the outer periphery of the impeller.	Creating	5
2	The diameter of an impeller of a centrifugal pump at inlet and outlet are 30 cm and 60 cm respectively. Determine the minimum starting speed of the pump, if it works against a head of 30 m.	Creating	5
3	A centrifugal pump having an overall efficiency of 80% delivers 1850 liters of water per minute to a height of 20 meters through a pipe of 100mm diameter and 95 meters length. Taking f=0.0075, find the power required to drive the pump.	Evaluating	5
4	The diameter of an impeller of a centrifugal pump at inlet and outlet are 30 cm and 60 cm respectively. Determine the minimum starting speed of the pump, if it works against a head of 30 m.	Evaluating	5
5	A centrifugal pump having an overall efficiency of 80% delivers 1850 liters of water per minute to a height of 20 meters through a pipe of	Evaluating	5

S. No.	Question	Blooms Taxonomy Level	Course Outcomes
	100mm diameter and 95 meters length. Taking f=0.0075, find the power required to drive the pump.		
6	How friction effects in suction and delivery pipes on Indicator diagram with a neat sketch?	Analyzing	5
7	Draw and explain ideal indicator diagram ?	Remembering	5
8	A single acting reciprocating pump, running at 50 r.p.m., delivers $0.01m^3/s$ of water The diameter of the piston is 200 mm and stroke length 400 mm. Determine: (i)The theoretical discharge of the pump, (ii) Coefficient of discharge, and (iii) slip and the percentage slip of the pump.	Evaluating	5

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