

ALPHA COLLEGE OF ENGG & TECH
ODD SEM 2018

ASSIGNMENT - 1

SUB : FPE (2151903) 5TH ME A

CH -1 Hydro Power Plant

CH - 2 Impact of Jet

NO	QUESTION	YEAR	MARKS
1	Sketch a hydro-power plant and explain its different elements.	Dec 11,15 Dec 16	7,7,3
2	Classify the Hydro-Electric power plants according to availability of head , quantity of water and nature of load.	DEC 15	7
3	List the factors affecting selection of site for hydro-electric power plant.	JUNE 16	7
4	List out important hydroelectric power plant installation in Gujarat. Also give advantages and disadvantages of HEPP.	DEC 16	4
5	Show that the efficiency of a free jet striking normally on a series of flat plates mounted on the periphery of a wheel can never exceed 50 % OR Show that in case of jet striking the flat plates mounted on wheel, the efficiency will be maximum when the tangential velocity of wheel is half of the jet.	Dec 10, June 12 JUNE 14	7
6	Prove that for a curved radial vane the efficiency is given by $\eta = 2 (Vw_1 u_1 + Vw_2 u_2) / V^2_1$.	June 11 DEC 13	7
7	Show that when a jet of water impinges on a series of curved vanes, maximum efficiency is obtained when the vane is semi-circular and the velocity of jet is double the velocity of vane.	Dec 11	7
8	Derive expressions for work done for impact of jet on a moving inclined plate.	DEC 16	4
9	What is jet propulsion? Derive the efficiency of jet propulsion.	JUNE 16 DEC 16	7,7
10	A jet of water impinges on a symmetrically curved vane at its center. The velocity of the jet is 60 m/s and the diameter 120 mm. the jet is deflected through an angle of 120° Calculate the force on the vane if the vane is fixed. Also determine the force if the vane moves with a velocity of 25 m/s in the direction of the jet. What will be the power and efficiency?	Dec 10	7
11	A jet of water moving with a velocity of 27m/s impinges tangentially to a single curved blade which is moving in the direction of jet with a speed of 12m/s. Jet is deflected through 45°. If the friction reduces the relative velocity by 20% calculate the angle through which the jet will leave the blade, work done /kg of water and efficiency.	June 11	7

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ASSIGNMENT - 2

SUB : FPE (2151903) 5TH ME A

CH -3 Hydraulic turbine

NO	QUESTION	YEAR	MARKS
1	What is a draft tube? Why is it used in a reaction turbine? What are the various types of it?	DEC 10, JUNE 11 DEC 13, JUNE 14, DEC 15, MAY 16	7
2	Define the term "Governing of a turbine". Explain with neat sketch governing mechanism of Francis Turbine.	Dec 10, Dec 11 June 12, June 14 Dec 15	7
3	Explain how hydraulic turbines are classified.	June 11, Dec 13 Dec 15, May 16	3,7
4	Define specific speed of a turbine and derive an expression for the same.	Dec 10, June 15 Dec 16	7
5	Derive the expression for maximum hydraulic efficiency of a Pelton wheel turbine.	Jun14, Dec 14 June 16	7
6	What are the ill effects of cavitation in turbine ? Give causes and remedies to avoid cavitation in a hydraulic turbine.	Dec 11, Dec 13	7
7	Explain the following terms with reference to water turbines. Give expression of each efficiencies. (1) Hydraulic efficiency (2) Mechanical efficiency and (3) Overall efficiency	June 12	7
8	Give detailed classification of Francis turbine and explain function of wicket gate. Compare Francis turbine with Kaplan turbine also.	Dec 12	7
9	What is degree of reaction? Prove that for Francis turbine degree of reaction is 50%.	June 16	7
10	Explain function of components of Pelton turbine.	Dec 12	4
11	State advantages and disadvantages of Francis turbine over Pelton turbine.	Dec 13	4
12	Explain construction and working of Pelton wheel turbine and derive expression for maximum hydraulic efficiency of Pelton wheel turbine.	Dec 14	7
13	The following data is related to a pelton wheel turbine. (I) Head at the base of the nozzle = 80 m (II) Diameter of the jet = 100 mm (III) Discharge of the nozzle = 0.30 m ³ /s (IV) Power at the shaft = 206 KW (V) Power absorbed in mechanical resistance = 4.5 KW Determine power lost in nozzle and power lost due to hydraulic resistance in the runner.	Dec 10	7
14	Define the term "Governing of a turbine". Explain with neat sketch governing mechanism of Francis Turbine.	Dec 10	7
15	Differentiate clearly between Impulse turbine and Reaction turbine..	Dec 12	3

16	A Pelton turbine is to be designed for following specifications: shaft power=11770KW, Head=380m, speed=750rpm, overall efficiency=86%, jet diameter not to exceed one sixth of wheel diameter, Determine the wheel diameter, number of jets required, diameter of jet. assume $C_v = 0.985$, $v = 0.45(2gH)^{0.5}$.	June 11	7
17	A turbine is to operate under a head of 25 m at 200rpm. The discharge is 9m ³ /sec. If the efficiency is 90% determine, specific speed of machine, power generated, type of turbine and performance under head of 20 m.	June 11	7
18	Why governing of water turbine is required? Explain governing of any one hydraulic turbine with neat sketch.	June 12	7
19	Explain the following terms with reference to water turbines. Give expression of each efficiencies. (1) Hydraulic efficiency (2) Mechanical efficiency and (3) Overall efficiency	June 12	7
20	Explain impulse turbine with neat sketch.	Dec 16	7

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ASSIGNMENT - 3

SUB : FPE (2151903) 5TH ME A

CH -4 Centrifugal Pumps
CH -5 Reciprocating Pumps

NO	QUESTION	YEAR	MARKS
1	Give classification of Centrifugal pump and derive expression for the minimum starting speed of the centrifugal pump.	Dec 10, Dec 12 Dec 14, June 15 Dec 16	3,7
2	With neat sketch explain construction and working of submersible pump. Also explain its advantages and disadvantages.	June 11, June 12 June 16, Dec 16	4,7
3	Discuss the various characteristic curves of a centrifugal pump.	Dec 11, June 14 Dec 16	4,7
4	Explain following terms: Net positive suction head, Priming, Cavitation in pump.	June 11	7
5	Write brief note on: Multi-stage Centrifugal pump.	Dec 13	7
6	Write down difference between Positive displacement pumps and Roto-dynamic pumps.	Dec 16	7
7	Define and derive specific speed relation for pump.	Dec 15	3
8	What is cavitation? What are its causes? How it can be prevented in centrifugal pump.	Dec 15	7
9	Compare Reciprocating pump with Centrifugal pump. Draw theoretical indicator diagram of reciprocating pump and explain function of air vessel.	Dec 12 , June 14 Dec 14	7
10	Explain the following terms: Multi-stage pumps, cavitation, Air vessel	June 15, Dec 15	7
11	What is mud pump? Write its applications.	June 13, Dec 16	7
12	Give classification of Reciprocating pump. Draw neat sketch of single acting reciprocating pump.	June 12	7
13	Find the power required to drive a centrifugal pump which delivers 0.04m ³ /s of water to a height of 20 m through a 15 cm diameter pipe and 100 m long. The overall efficiency of the pump is 70 % and co-efficient of friction $f = 0.015$ in the formulae $h_f = 4flv^2 / 2gd$.	Dec 10	7
14	A centrifugal pump raises the head of water through 4m and delivers 1.5m ³ /sec. The speed of the impeller is 180rpm. The impeller diameter at the outlet is 1.3m and area at the periphery is 0.3m ² . The ratio of the outlet at the inlet diameter is 2m and vane angle at the outlet is 30°. Determine the hydraulic efficiency, power required and minimum starting speed.	June 11	7
15	Explain construction and working of reciprocating pump.	June 15	7

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ASSIGNMENT - 4

SUB : FPE (2151903) 5TH ME A

“Compressors”

NO	QUESTION	YEAR	MARKS
1	Describe principle construction and working of centrifugal compressor.	June 11	7
2	Derive an expression for indicated work of reciprocating air compressor considering its clearance.	June 11	7
3	Describe the working of a screw compressor and list its applications.	Dec 11	7
4	Explain Root blower with the neat sketch and derive expression for the Roots efficiency.	Dec 14 June 16, Dec 16	7
5	Prove that the work done / kg of air in single stage reciprocating air compressor without clearance is given by $W = \frac{n R T_1}{(n-1)} \{ (P_2/P_1)^{(n-1)/n} - 1 \}$ Where notations have their usual meaning.	Dec 10	7
6	With neat sketch explain construction and working of Scroll compressor.	June 13 Dec 13 Dec 15	7
7	Explain the phenomenon of surging and stalling in an axial flow compressor.	Dec 11, Dec10 Dec 16	7
8	Justify the need for multi-staging in a reciprocating air compressor. List any two advantages of multistage compression.	Dec 11, June 15 Dec 13	7
9	With the help of velocity triangles and head-capacity curves, discuss salient features of radial, backward and forward curved vanes in a centrifugal compressor.	Dec 11	7
10	Air at 1 bar and 20 ° C is compressed to a pressure of 55 bar in a two stage reciprocating air compressor. Inter-cooler cools the air to a temperature of 40 ° C at 10 bar. The diameter of low pressure cylinder is 175 mm and both the cylinders have 225 mm stroke. If the compression follows the law $pV^{1.2} = C$, find the indicated power of compressor if it runs at 150 rpm.	Dec 11	7
11	With a suitable sketch explain the working principle of an axial flow compressor. Draw the stage velocity triangles.	June 12	7
12	Derive an expression for the optimum value of the inter-cooler pressure in a two stage reciprocating air compressor for perfect inter cooling condition.	June 12	7
13	Classify air compressors and state application and uses of compressed air.	Dec 15	7
14	Compare reciprocating compressor and centrifugal compressor.	Dec 16, June17	3, 7
15	Define following terms: Power input factor, slip factor, Pressure coefficient, Pre-whirl.	Dec 13	4
16	Draw stage velocity diagram of an axial flow compressor.	Dec 12	3
17	With a suitable sketch explain the working principle of an axial flow compressor. Draw the stage velocity triangles.	June 12, June 14 Dec 14	7

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ASSIGNMENT - 5
 SUB : FPE (2151903) 5TH ME A
CH-10 "Miscellaneous Machines"

NO	QUESTION	YEAR	MARKS
1	With neat sketch explain construction and working of hydraulic crane.	June 11	7
2	Write a short note on hydraulic ram.	Dec 11, June 16 Dec 16	7
3	Explain working of Differential hydraulic accumulator with neat sketch.	June 12	7
4	Define – (a) Hydraulic Turbine, (b) Hydraulic machines.	Dec 16	3
5	Write down comparison between Fluid coupling and Fluid torque converter.	Dec 16	4
6	Write short note on "Hydraulic jack,"	Dec 15	7
7	With neat sketch explain construction and working of hydraulic torque convertor?	June 13	7
8	With neat sketch explain construction and working of hydraulic press.	Dec 12, Dec 15 June 15	3,7
9	Explain working of Differential hydraulic accumulator with neat sketch.	Dec 10, Dec 15 June 16	7
10	Write short notes on: Hydraulic intensifier and Air lift pump.	Dec 11, Dec 13 June 14	2,7

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