

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous) Dundigal, Hyderabad -500 043

MECHANICAL ENGINEERING

TUTORIAL QUESTION BANK

Course Name	DESIGN OF HYDRAULIC AND PNEUMATIC SYSTEMS
Course Code	BCC004
Class	M. Tech II Semester CAD/CAM
Branch	Mechanical
Year	2017 - 2018
Course Coordinator	Mr. M. Vijay Kumar, Asst. Professor

OBJECTIVES:

This course introduces the basic components and functions of hydraulic and pneumatic systems. Design of power pack, design of hydraulic and pneumatic circuit. Design of circuit that can be used in automation.

S No	QUESTION BANK	Blooms taxonomy	Course	
		level	Outcomes	
	UNII – I OH AND HVDRAULICS SVSTEM	16		
Part -	A (Short Answer Questions)			
1	What is a fluid? What are hydraulic fluids?	Remember	1	
2	Explain the Pascal's law	Remember	1	
3	Explain the Bernoulli's principle	Remember	1	
4	Explain the Torricelli's principle	Remember	1	
5	Explain fluid principle.	Remember	1	
6	Briefly explain fluid properties.	Remember	1	
7	Explain viscosity.	Remember	1	
8	Explain the properties of hydraulic fluids	Remember	1	
9	Name basic components in hydraulic systems.	Remember	1	
10	Name few applications of hydraulics.	Remember	1	
Part -	Part - B (Long Answer Questions)			
1	List all the properties that a good hydraulic fluid should posses.	Remember	1	
2	Discuss the general criteria to be considered for selection of	Remember	1	
	hydraulic fluid.			
3	Explain in detail different element of hydraulic system.	Remember	1	
4	An oil having a density of 0.89g/cm ³ is tested using a kinematic	Remember	1	
	viscosimeter. The given amount of oil flowed through the			
	capillary tube in 250s. The calibration constant is 0.100. Find			
	the kinematic and absolute viscosities in poise and centipoises.			
5	Describe the environmental issues dealing with developing	Remember	1	
	biodegradable fluids, reduce oil leakage and reducing noise			
	levels.			
6	Differentiate between hydraulics and pneumatics.	Remember	1	
1	Compare the use fluid power to a mechanical system by listing	Remember	1	
D (the advantages and disadvantages of each.		1	
Part - C (Problem Solving and Critical Thinking Questions)				
1.	Comment on the difference between using pneumatic fluid	Understand	1	

	a survey and build require fluid a survey		
	power and hydraulic fluid power.		<u> </u>
2.	Explain oil hydraulic element and their representation with a neat sketch.	Remember	1
3.	Establish the correlation with units between mechanical force	Remember	1
	system, electrical voltage system and hydraulic pressure		
	system.		
4.	Explain the types of hydraulic fluids, and selection criteria for	Remember	1
	a hydraulic system.		
5.	Explain hydraulic system for force and motion, analysis in	Remember	1
	automation.		
6.	Explain pneumatic system for force and motion analysis in	Remember	1
	automation.		
	UNIT-II		
	HYDRAULIC PUMPS		
Part –	A (Short Answer Questions)		
1	What is the function of a pump.	Remember	1
2	Distinguish between single acting and double acting actuators.	Understand	2
3	What is the difference between fixed displacement and variable	Remember	1
	displacement pump.		
4	Expalin in detail about piston pump.	Remember	1
5	What is a differential cylinder	Remember	1
6	State the advantages of a positive displacement over non positive	Remember	1
Ĭ	displacement nump		1
7	What is meant by pump optimization	Remember	1
8	Explain difference between linear and rotary actuator	Remember	1
0	Write a short note on specifications of hydraulia numps	Understand	2
10	What are the main access in calculation of hydraulic numps.	Understand	2
10	What is meant by sushioning affect	Dilucistanu	2
11	What is meant by cushoning effect.	Remember	2
12	What is tologoon is ordin don when would it normally he used	Remember	2
13	What is telescopic cylinder, when would it normally be used. Remember		2
Part -	B (Long Answer Questions)		
	What is the different between a variable displacement pump and Understand		2
	fixed displacement pump. When do user prefer a variable		
	displacement and fixed displacement pump.		
2	Why cushioning needed in a hydraulic cylinder. Explain with a Understand		2
	neat sketch, the principle of operation of a fixed cushioned		
	Cynnder.	I I u de vete u d	2
3	Explain the working of a vane pump. Derive an expression for	Understand	2
	Ineoretical discharge	u a II. da usta u d	2
4	Distan numma. What are marits of it	ups Understand	2
	Piston pumps, what are ments of it.	I Indoneton d	2
5	State various types of linear actuators used in hydraulic system.	Understand	2
	what is a telescopic cylinder. State any three applications of such	a	
6	Cylinder.	f Damamhan	1
0	Explain detail about selection, specifications and characteristics of	Keinember	1
7	Explain the construction and function of interval coor material	I Indonator d	2
/ Dest	C (Droblem Solving and Critical Thinking)	Understand	2
rart –	C (Froblem Solving and Critical Lininking)	D an	2
	A cylinder has a bore of 125mm diameter and a rod of /Umm	Kemember	2
	diameter. It drives a load of 2000kg vertically up and down at a		
	maximum velocity of 3m/s. The load is slowed down to rest in th	e	
	cusnioning length of 50mm. If the relief valve is set at 140 bar,	1	
	determine the average pressure in the cushions while extending a	na	
	retracting.		

2	Explain any two types piston types pumps prime mover mechanisms with neat sketches	Remember	2
3	Explain importance of piston rod and effect on pressure	Understand	2
4	Differentiate internal and internal gear nump	Remember	2
5	Describe screw nump and vane nump with neat sketches	Understand	2
Part -	A (Short Answer Questions)	Chicolowing	
1	Explain power pack in detail	Understand	3
2	Explain pressure relief valve	Understand	3
3	Explain beating and cooling systems for hydraulic power pack	Understand	3
	Explain feating and cooling systems for hydraulic power pack.	Understand	2
4	Explain the importance of line pressure in power pack.	Understand	3
J.	Describe the selection of size and capacity of power pack.	Understand	3
rart - 1	Describe the newer peak with a next sketch	Understand	2
	Describe the power pack with a heat sketch.	Understand	3
2	by drawling aircraft with a program ratio function, and design a	Understand	3
2	Describe the construction of processore relief valve in hydroxilie	Understand	2
5	Describe the construction of pressure refiel valve in hydraulic	Understand	3
	System with a heat sketch.	TT. J	2
4	Describe the safety systems in hydraulic circuits.	Understand	3
5	Design and sketch hydraulic power pack of 20 liter capacity	Understand	3
	with a gear pump and induction motor and other required		
D (
Part -	C (Problem Solving and Critical Linking Questions)	I In donaton d	2
	Design and sketch the hydraulic power pack of 15 liter capacity	Understand	5
	aloments		
	Design a hydraulia gear nump with 2.5 module and establish the	Understand	2
2	discharge rate and pressure range	Understand	5
3	Discuss the details of the following factors in selection of	Understand	3
5	hydraulic nump	Understand	5
4	How the hydraulic motors are rated and derive on equation for	Understand	3
	torque of the motor	Onderstand	
5	Design and sketch pressure relief valve for 10 to 20 bar pressure	Understand	3
	valve.		_
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	UNIT-IV		
	HYDRAULIC CIRCUIT AND ACCUMULA	ATOR	
Part -	A (Short Answer Questions)		
1	Summarize the applications of synchronizing circuits	Remember	4
2.	How are accumulators used in hydraulic circuits.	Remember	4
3.	Draw the symbols of flow control valves, pressure control	Remember	4
	valves.		
4.	Explain regenerative circuit.	Remember	4
5.	Explain the usage of check valves in hydraulic circuit.	Remember	4
6.	Describe the criteria of selection of hydraulic pump.	Remember	4
1.	Classify the accumulator in hydraulic system.	Remember	4
Part –	B (Long Answer Questions)	TT 1 / 1	1 4
I.	neat sketch.	Understand	4
2.	Describe the sequencing and synchronizing circuit in hydraulic system with a neat sketch.	Understand	4
3.	Describe standard in circuit diagram representation.	Understand	4
4.	Differentiate between flow control valve and pressure control	Understand	4
	valve.		
5.	Differentiate Between meter-in and meter-out circuits.	Understand	4
6.	Differentiate linear and rotary accumulator in hydraulic	Understand	4

Part - C. (Problem Solving and Critical Thinking Questions) 1. Sketch and explain numerical the differences in Meter-in, malysis of a hydraulic circuit in designing the force and motion analysis of a hydraulic circuit in pneumatic systems, write down the applications of bleed-off circuit in pneumatic systems, write down of check valves. Merits, demerits and applications. Apply 4 0 Design a hydraulic circuit with check valves. Explain the use of check valves. Merits, demerits and applications. Apply 4 5. Design a hydraulic circuit with directional control valve, solenoid valve with a neat sketche. Apply 4 6. What is an accumulator. State the application of accumulator. Explain the use of accumulator as leakage compensator with a hydraulic circuit. UNTFV Understand 5 10 Understand 5 <th></th> <th>systems.</th> <th></th> <th></th>		systems.		
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Prepared By: M. Vijay Kumar Asst.Professor

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