SHRI SHANKARACHARYA INSTITUTE OF PROFESSIONAL MANAGEMENT AND TECHNOLOGY

DEPARTMENT OF MECHANICAL ENGINEERING

Class Test – II	Session- 2021-22	Month- Jan
Sem- 5th	Subject- ICE	
Code - C037511(037)	Time Allowed: 2 hrs	Max Marks: 40

Note: -

Q. No	Questions	Marks	Levels of Bloom's taxonomy	CO
	Unit – I			
1.A	What is petrol injection? What are its advantages and disadvantages	4	Remembering	CO2
1.B	Discuss the air fuel ratio requirements of a petrol engine from no load to full load?	8	Remembering	CO3
1.C	What do you mean by MPFI system? What do you mean by nozzle lip? What are the factors affecting carburetion?	8	Remembering	CO3
1.D	The diameter of a venturi of a simple carburetor is 2 cm and it's c_{da}=0.85. the fuel nozzle diameter is 1.25mm and c_{df}=0.66. the lip of the fuel nozzle is 5mm. find a) A:F ratio for pressure drop of 0.007bar when nozzle lip is neglected b) A:F ratio when nozzle lip is considered c) The minimum velocity of air required to start the fuel flow when lip is provided?	8	Applying	CO3

	Unit – II			
2.A	Describe dry sump and wet sump lubrication system for I.C engines. What is antifreeze mixture for coolants and where it is used?	4	Remembering	CO4
2.B	What do you understand by ignition? Describe the battery ignition system with the help of sketch?	8	Remembering	CO4
2.C	Define wet sump lubrication. What are their varieties? Explain anyone with suitable figure?	8	Remembering	CO4
2.D	Why cooling of an I.C engine is necessary? Discuss the disadvantages of overcooling? Describe with a sketch thermostatically controlled forced circulation system?	8	Applying	CO4

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DEPARTMENT OF MECHANICAL ENGINEERING

Class Test – II	Session- 2022-23	Month- January
Sem- 5th	Subject- Fluid Machines	
Code :- C037512(037)	Time Allowed: 2hr.	Max Marks: 40

Note: - 1.first Question (A) from both unit are compulsory.
2. Solve any two from B,C,D of each unit.

Q. No	Questions	Marks	Levels of Bloom's taxonomy	CO
Unit – I				
1.A	Define Head and efficiency of turbine.	4	Remembering	2
1.B	A Pelton wheel is to be designed for a head of 60 m when running at 200 r.p.m. The Pelton wheel develops 95.6475 kW shaft power. The velocity of the buckets = 0.45 times the velocity of the jet, overall efficiency = 0.85 and co-efficient of the velocity is equal to 0.98.	8	Applying	2
1.C	Determine the power given by the jet of water to the runner of a Pelton wheel which is having tangential velocity as 20 m/s. The net head on the turbine is 50 m and discharge through the jet water is 0.03 m/s. The side clearance angle is 15° and take Coefficient of velocity= 0.975.	8	Applying	2
1.D	Derive an expression of maximum Hydraulic efficiency for Pelton turbine.	8	Understanding	2

Q. No	Questions	Marks	Levels of Bloom's taxonomy	CO
Unit – II				
2.A	Explain the Draft tube	4	Remembering	3
2.B	Define specific speed and derive an expression for specific speed of the turbine.	8	Understanding	3
2.C	233 litres of water per second are supplied to an inward flow reaction turbine. The head available is 11 m. The wheel vanes are radial at inlet and the inlet diameter is twice the outlet diameter. The velocity of flow is constant and equal to 1.83 m/s. The wheel makes 370 r.p.m. Find: (a) Guide vane angle, (b) Inlet and outlet diameter of the wheel,(c) The width of the wheel at inlet and exit. Neglect the thickness of the vanes Assume that the discharge is radial and there are no losses in the wheel. Take speed ratio = 0.7.	8	Applying	3

2.D	A Kaplan turbine runner is to be designed to develop 9100 kW. The net available head is 5.6 m. If the speed ratio= 2.09, flow ratio = 0.68, overall efficiency 86% and the diameter of the boss is 1/3 the diameter of the runner. Find the diameter of the runner, its speed and the specific speed of the turbine.	8	Applying	3

18/01/23/MECH/FM/S-II

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DEPARTMENT OF MECHANICAL ENGINEERING
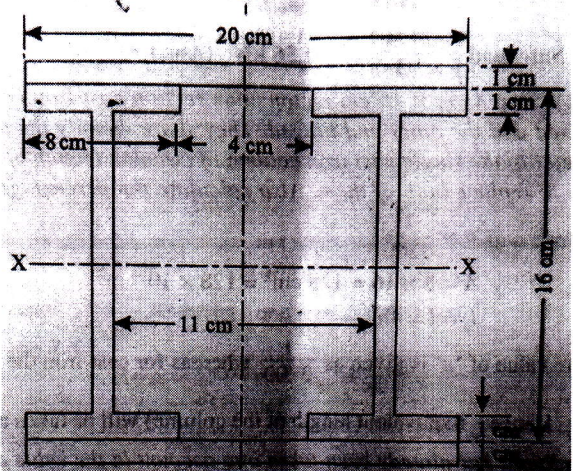
Class Test: II	Session: July-January 2022	Month: January
Sem- 5th Sem	Subject: Solid Mechanics	
Code – C037512(037)	Time Allowed: 2 hrs	Max Marks: 40

Note: - Attempt all question. Parts (a) are compulsory of each question. Solve any two parts from (b), (c) and (d) of each question.

Q. No	Questions	Marks	Levels of Bloom's taxonomy	CO
	Unit – I			
1.A	Define pressure vessels or shells? Write different stresses act upon them with expression.	4	Remembering	CO1
1.B	Show that the volumetric strain of a cylindrical shell is the sum of longitudinal strain and twice of hoop strain. Also derive the volumetric strain of a cylindrical shell.	8	Creating	CO2
1.C	A thin cylindrical shell has the following dimensions: length 1.5 m, external diameter 300 mm, thickness of the metal 10 mm, it is filled with liquid at atmospheric pressure. Determine the value of the pressure exerted by the liquid if additional 20000 cm³ of water is pumped into the cylinder. Also calculate the longitudinal and hoop stress induced in the cylinder wall. Take E = 200 GPa and Poisson's ratio 0.33.	8	Creating	CO1
1.D	Wall thickness of a cylindrical shell of 800 mm internal diameter and 2 meter long is 10 mm. If the shell is subjected to an internal pressure of 1.5 MPa, find the following: (i) The maximum intensity of shear stress induced. (ii) The change in dimensions of the shell. Take E=200 GPa v= 0.3	8	Creating	CO2

Q. No	Questions	Marks	Levels of Bloom's taxonomy	CO
	Unit – II			
2.A	Write equivalent length for different end conditions of column and define shear centre.	4	Remembering	CO2
2.B	A solid round tube 3 m long and 5 cm in diameter is used as a column with both ends hinge. Find the collapsing load. What will be the crippling load if: (i) both the ends are built in (fixed) (ii) one end is built in and one end is free (ii) one end is built in and other is hinged Take E = 2 × 10⁵ N/mm².	8	Creating	CO1

2.C	Find the Eulers crushing load for a hollow cylindrical cast iron, 15 cm external dimeter and 2 cm thick, if it is 6 m long and hinged at both ends, E = 80 GPa. Compare this load with the crushing load given by Rankine's formula; using yield stress 550 MPa and Rankine constant 1/1600. For what length of strut of this cross section done Euler formula ceases to apply.	8	Creating	CO3
2.D	A column is made up of two rolled steel joists of I-section; 16 cm x 8cm x 1cm thick with plate 20 cm x 1 cm riveted with flanges one each on the top and on the bottom. The edges of the plates being flush with the outside edges of joists' flanges. Determine, by Rankine's formula the safe load the column of 4 m length, with both ends fixed, can carry with factor of safety 3. Take; a= 1/7500, and σ_c= 320MN /m^2	8	Creating	CO2

19/01/23/MECH/5-I/5M

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DEPARTMENT OF MECHANICAL ENGINEERING

Class Test – II	Session- July -Dec 2022	Month- Jan 2023
Sem- 5	Subject- Operation Research	
Code –C037531(037)	Time Allowed: 2 hrs.	Max Marks: 40

Note: - Each Question consist of three part .part a is compulsory .Answer any one from part b and part c.

Q. No	Questions	Marks	Levels of Bloom's taxonomy	CO
	Unit – IV			
A	Explain the rules of network construction.	4	U	CO4
B	1. Tasks A, B, C ...H, I constitute a project. The precedence relationship are A<D; A<E; B<F; D<F; C<G; C<H; F<I; G<I The project time, in days, of each task is as follow: 	Task	A	B	C	D	E	F	G	H	I
---	---	---	---	---	---	---	---	---	---
Time	8	10	8	10	16	17	18	14	9 | (a) Draw a network to represent the project the project (b) Identify the critical path. (c) Compute the earliest start time(EST), earliest finish time (EFT), latest start time (LST) and latest finish time (LFT) for each event. (d) Compute the total float.	16	A	CO4
C	The time estimates (in weeks) for the activity of PERT network are given below: | Activity	to	tm	tp
---	---	---	---
1-2	1	1	7
1-3	1	4	7
1-4	2	2	8
2-5	1	1	1
3-5	2	5	14
4-6	2	5	8
5-6	3	6	15	 (a) Draw the project network and identify all paths through it. (b) Determine the expected project length. (c) Calculate the standard deviation & variance of the project length. (d) What is the probability that the project will be completed (i) At least 4 weeks earlier than expected time? (ii) No more than 4 weeks later than expected time? (e) If the project due date is 19 weeks , what is the probability of not meeting the due date? (a) What should be the scheduled completion time for the probability of completion to be 90%?	16	A	CO4

<table>
<tr><td colspan="5" align="center">Unit – V</td></tr>
<tr>
<td>A</td>
<td>What is game theory and discuss about saddle point.</td>
<td>4</td>
<td>U</td>
<td>CO5</td>
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<td>B</td>
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Solve the following game by using the principle of dominance:

	i	ii	iii	iv	v	vi
1	4	2	0	2	1	1
2	4	3	1	3	2	2
3	4	3	7	-5	1	2
4	4	3	4	-1	2	2

</td>
<td>16</td>
<td>A</td>
<td>CO5</td>
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<tr>
<td>C</td>
<td>

Solve the following game by using the principle of dominance:

	B1	B2	B3	B4
A1	35	65	25	5
A2	30	20	15	0
A3	40	50	0	10
A4	55	60	10	15

</td>
<td>16</td>
<td>A</td>
<td>CO5</td>
</tr>
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19/01/25/MECH/OR/5-II

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DEPARTMENT OF MECHANICAL ENGINEERING

Class Test: II	Session: July-December, 2022	Month: January, 2023
Semester 5th	Subject: Dynamics of Machines	
Code: C037514(037)	Time Allowed: 2 Hours	Max Marks: 40

Note: - Part A of Questions 1 and 2 is compulsory, from other parts B, C and D of Questions 1 and 2, attempt any two parts.
Ignore the columns of Level of Bloom's taxonomy and CO.

Q. No	Questions	Marks	Levels of Bloom's taxonomy	CO
	Question – 1			
1.A	Analyze the difference between effects of Gyroscopic Couple during Steering and Pitching of a ship during sailing.	4	Analyze	3
1.B	An aeroplane flying at 240km/hr turns towards left and completes a quarter circle of 60m radius. The mass of rotary parts of engine and propeller of plane amounts to 450kg with a radius of gyration of 320mm. Engine speed is 2000rpm clockwise when viewed from the rear. Calculate (i) Gyroscopic couple on aircraft and state its effect. In what way is the effect changed when the aeroplane turns towards right. If the engine rotates in clockwise direction when viewed from front (nose) and aeroplane turns (a) left and then (b) right.	8	Apply	3
1.C	A disc with radius of gyration 60mm and a mass of 4kg is mounted centrally on a horizontal axle of length 80mm between bearings. It spins about the axle at 800rpm counterclockwise when viewed from right hand side bearing. Axle precesses about vertical axis at 50 rpm in clockwise direction when viewed from above. Calculate the resultant reaction at each bearing due to mass and gyroscopic effect.	8	Apply	3
1.D	A rail car has a total mass of 4000kg. There are two axles, each of which together with its wheels and gearing has a total mass moment of inertia 30kgm^2. Centre distance between the two wheels on an axle is 1.5m and each wheel is 46.5cm radius. Each axle is driven by a motor, speed ratio is 1:3. Each motor with its gear has a mass moment of inertia of 15kgm^2 and runs in direction opposite to that of axle. The centre of gravity of car is 105cm above the rails. Determine the limiting speed of this car when rounding a curve of 300m radius such that no wheel leaves the rail.	8	Apply	3

P.T.O

	Question – 2			
2.A	Analyze the reason of free vibration in case of elastic bodies.	4	Analyze	4
2.B	Derive with suitable diagram the expressions for piston effort, force acting along the connecting rod, thrust on the sides of cylinder walls in a piston cylinder mechanism neglecting the weight of the connecting rod.	8	Apply	5
2.C	Following data relate to a shaft held in long bearings: length of shaft=1.2m, diameter of shaft=14mm, mass of rotor at midpoint=16kg, eccentricity=0.4mm, young's modulus of elasticity=200GPa, permissible stress in shaft=70×10^6 N/m^2. Find critical speed of shaft and the range of speed over which it is unsafe to run the shaft. Assume shaft to be massless.	8	Apply	4
2.D	Derive an expression for natural frequency of free transverse vibrations of shaft subjected to a number of points loads and uniformly distributed load by Dunkerley's method.	8	Apply	4

20/01/23/MECH/DOM/S-I