SHRI SHANKARACHARYA INSTITUTE OF PROFESSIONAL MANAGEMENT AND TECHNOLOGY

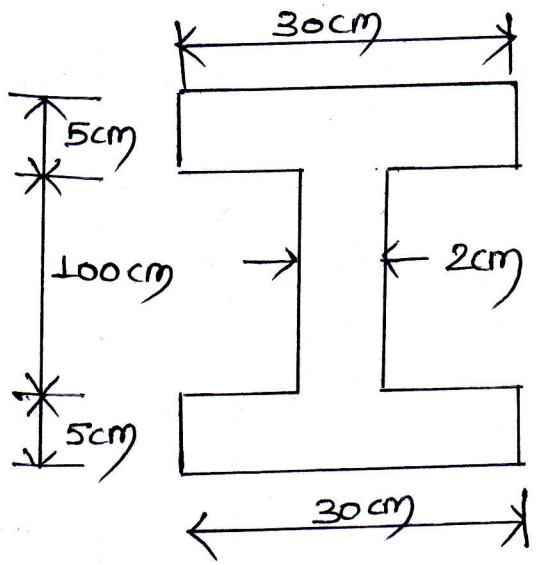
DEPARTMENT OF MECHANICAL ENGINEERING

Class Test – I	Session- July to December 2023	Month- November
Sem- 5th	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	Analyze the stresses working on pressure vessel and define the pressure vessel or shell.	4	Analyze	CO3
1.B	A steel cylinder of 1000 mm inside diameteris to be designed for an internal pressure of 4.8 MN/m^2, Calculate (i) The thickness if max shear stress is not to exceed 21 MN/mm^2 (ii) The increase in volume due to working pressure, if cylinder is 7m long with closed ends Neglect any constraints of due to ends. E = 200 GN/m^2, poisson's ratio=1/3	8	Applying	CO3
1.C	A built-up cylinder shell of 300 mm diameter, 3m long and 6mm thick is subjected to an internal pressure of 2MN/m^2. Calculate the change in length, diameter and volume of the cylinder underthat pressure if the efficiency of longitudinal and circumferential jointsis 80%. and 50%. Respectively. E = 200GN/m^2, m= 3.5.	8	Applying	CO3
1.D	A cylindrical shell 90 cm long and 20 cm internal diameter having thickness of metal as 8 mm is filled with fluid at atmospheric pressure. If an additional 20 cm^3 of fluid is pumped into the cylinder, find (i) the pressure exerted by the fluid on the cylinder and (ii) the hoop stress induced.	8	Applying	CO3

P.T.O.

Unit – II				
2.A	Write the assumptions of Euler's theory for long column. Also analyse and write equivalent length for different end conditions of column.	**4**	Analyze	CO4
2.B	Deduce the expression for Euler crippling load for column with one end fix and other end free.	**8**	Applying	CO4
2.C	Derive the expression for Euler crippling load for column with both end fix.	**8**	Applying	CO4
2.D	A built-up beam is simply supported at ends. Compute Its length, gives that it issubjected to load of 40kN per meterlength, it is deflected by 1cm. Find safe load, if this beam is used as a corm with bothends fixed. Assume a factor ofSafety 4. Use Eular's formula. E = 210 GN/m^2 	**8**	Applying	CO4

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SHRI SHANKARACHARYA INSTITUTE OF PROFESSIONAL MANAGEMENT AND TECHNOLOGY

DEPARTMENT OF MECHANICAL ENGINEERING

Class Test – I	Session- July – Dec 2023	Month- November
Sem- 5th	Subject- Internal Combustion Engine	
Code – C037511(037)	Time Allowed: 2 hrs	Max Marks: 40

Note: - 1. Students are Required to focus on question and marks columns only.
2. In Unit I & II, Question A is compulsory and attempt any two from B, C & D.

Q. No	Questions	Marks	Levels of Bloom's taxonomy	CO
	Unit – I			
1.A	What is external combustion engine?	**4**	Remembering	1
1.B	Write the comparison between four stroke S.I & C.I engine.	**8**	Understanding	1
1.C	What are the reasons for deviation of actual cycles from air standard cycles? Draw the actual valve timing diagram for four stroke C.I engine.	**8**	Understanding	1
1.D	Explain reasons of ignition and injection advance.	**8**	Understanding	1
	Unit – II			
2.A	Define cetane number?	4	Understanding	2
2.B	With the help of pressure crank-angle diagram discuss the various stages of combustion in C.I engines.	8	Understanding	2
2.C	Analyze the phenomenon of knock in C.I engine with the help of neat sketch.	8	Analyzing	2
2.D	What are the factors influencing the delay period?	8	Understanding	2

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DEPARTMENT OF MECHANICAL ENGINEERING

Class Test – I	Session- 2023-24	Month- November
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	Explain Boundary layer separation and its Method of preventation.	**4**	Remembering	1
1.B	Derive an expression of wall shear on Flat plate due to boundary layer generation in terms of Momentum Thickness.	**8**	Understanding	1
1.C	Explain Energy thickness and derive an expression for Energy Thickness.	**8**	Understanding	1
1.D	A kite weighing 0.8 kgf (7.848 N) has an effective area of 0.8 m^2. It is maintained in air at an angle of 10° to the horizontal. The string attached to the kite makes an angle of 45° to the horizontal and at this position the value of co-efficient of drag and lift are 0.6 and 0.8 respectively. Find the speed of the wind and the tension in the string. Take the density of air as 1.25 kg/m^3.	**8**	Applying	1
	Unit – II			
2.A	Explain impulse moment principle.	**4**	Remembering	2
2.B	For the velocity profile for laminar boundary layer flows given as $\frac{u}{U_\infty} = 2\left(\frac{y}{\delta}\right) - \left(\frac{y}{\delta}\right)^2$ Find an expression for boundary layer thickness(**δ**), shear stress (τ_0),coefficient of drag C_D and drag force in terms of Reynolds no.	**8**	Understanding	1
2.C	A man weighing 981 N descends to the ground from an aeroplane with the help of a parachute against the resistance of air. The shape of the parachute is hemispherical of 2 m diameter. Find the velocity of the parachute with which it comes down. Assume Cd = 0.5 and p for air = 0.00125 gm/cc and v = 0.015 stoke..	**8**	Applying	1

P.T.O.

2.D	Air is flowing over a smooth plate with a velocity of 10 m/s. The length of the plate is 1.2 m and width 0.8 m. If laminar boundary layer exists up to a value of $R_e = 2 \times 10^5$, find the maximum distance from the leading edge upto which laminar boundary layer exists. Find the maximum thickness of laminar boundary layer if the velocity profile is given by $\frac{u}{U_\infty} = 2\left(\frac{y}{\delta}\right) - \left(\frac{y}{\delta}\right)^2$	8	Applying	1

07/11/23/5-I

SHRI SHANKARACHARYA INSTITUTE OF PROFESSIONAL MANAGEMENT AND TECHNOLOGY

DEPARTMENT OF MECHANICAL ENGINEERING

Class Test – I	Session- July -Dec 2023	Month- Nov
Sem- 5th	Subject- Operation Research	
Code – C037531(037)	Time Allowed: 2 hrs	Max Marks: 40

Note: - Question (A) is Compulsory. Attempt any One question from part B and C, which carries 16 marks.
Students are Required to focus on question and marks columns only.

Q. No	Questions	Marks	Levels of Bloom's taxonomy	CO
	Section -I			
1.A	Find the initial basic feasible solution by North-west corner rule and also find the corresponding cost. To / Available From: 3 4 6 8 9 | 20; 2 10 1 5 8 | 30; 7 11 20 40 3 | 15; 2 1 9 14 16 | 13 Demand: 40 6 8 18 6	4	Apply	CO2
1.B	Find the optimum solution to the following transportation problem in which the cells contain the transportation cost in rupees. Solve by Vogel Approximate Method. W_1 W_2 W_3 W_4 W_5 Available F_1: 7 6 4 5 9 | 40 F_2: 8 5 6 7 8 | 30 F_3: 6 8 9 6 5 | 20 F_4: 5 7 7 8 6 | 10 Required: 30 30 15 20 5 | 100 (Total)	16	Apply	CO2
1.C	Solve the following Transportation problem (MODI Method) and obtained the optimum solution.	16	Analyze	CO2

	D1	D2	D3	D4	Supply
O1	2	2	2	1	3
O2	10	8	5	4	7
O3	7	6	6	8	5
Demand	4	3	4	4	

P.T.O.

Section -II

2.A	Write the scope of operation research.	4	Remember	CO1
2.B	Solve the following assignment Problem 18 26 17 11 13 28 14 26 38 19 18 15 19 26 24 10	16	Apply	CO2
2.C	Solve the following assignment Problem 5 7 11 6 8 5 9 6 4 7 10 7 10 4 8 3	16	Apply	CO2

07/11/23/5-II

SHRI SHANKARACHARYA INSTITUTE OF PROFESSIONAL MANAGEMENT AND TECHNOLOGY

DEPARTMENT OF MECHANICAL ENGINEERING

Class Test: I	**Session: July-December, 2023**	**Month: November, 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	Explain the working of a Centrifugal Governor with suitable diagram	4	Understand	1
1.B	A Porter governor with links 15cm long has a line of pivot points offset by 3cm from the vertical axis of governor. There are two fly masses each equal to 1.75 kg and central sleeve equal to 25kg. In the configuration when angles of inclination of links to governor axis are 30^0, governor sleeve starts lifting at 300rpm. If friction between sleeve and spindle is constant, calculate higher and lower speed of operation of governor in the configuration when angles made by links are 45^0 each.	8	Apply	1
1.C	In a spring loaded governor of Hartnell type, mass of each ball is 5kg and lift of sleeve is 50mm. Speed at which governor begins to float is 240rpm, and at this speed the radius of ball path is 110mm. The mean working speed of governor is 20 times the range of speed, when friction is neglected. If lengths of ball and roller arms are 120mm and 100mm respectively, and if distance between center of pivot of bell crank lever and axis of governor spindle is 140mm, find initial compression of spring, taking into account obliquity of arms.	8	Apply	1
1.D	In a Porter Governor, the arms and links are each 25cm long and intersect on the main axis. Each ball weighs 4.5kg and central load is 25kg. Sleeve is in the lowest position when arms are inclined at 30^0 to the vertical. The lift of the sleeve is 5cm. What is the force of friction at the sleeve if speed at ascent from lowest position is equal to the speed at beginning of descent from the highest position: What is then the range of speed of governor?	8	Apply	1

P.T.O.

Question – 2				
2.A	Explain the condition for static and dynamic balancing of rotating masses	4	Remember	2
2.B	(i) Define Sensitiveness of governor (ii) Define Stability of governors (iii) What is isochronous governor? (iv) Explain Hunting in Governors	8	Understand	1
2.C	Following particulars refer to a Proell governor with open arms: Length of all arms=200mm, distance of pivot of arms from axis of rotation=40mm, length of extension of lower arms to which each ball is attached=100mm, mass of each ball=6kg, mass of central load=150kg. If radius of rotation of balls is 180mm when arms are inclined at an angle of 40^0 to the axis of rotation, find equilibrium speed.	8	Apply	1
2.D	Analyze the need of different types of centrifugal governors	8	Analyze	1

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