### **SUBJECT- THEORY OF MAHINES**

### 4<sup>TH</sup> SEM MECHANICAL BRANCH

SHORT QUESTION:- (2 MARKS)

- 1. Define link and types of links.
- 2. State the difference between machines & structure.
- 3. Define kinematic pair.
- 4. Define link and kinematic pair.
- 5. What is degree of freedom?
- 6. What is Kutzbach criterion?
- 7. What is inversion of mechanism?
- 8. Define cam and follower.
- 9. Define limiting friction.
- 10. State the laws of friction.
- 11. What is over hauling in screw jack?
- 12. Define self locking in screw jack.
- 13. What is a clutch? What is its function?
- 14. What is dynamometer? State its types.
- 15. Define break and its types.
- 16. Define power transmission and different modes of power transmission.
- 17. Define slip in belt drive.
- 18. Define creep in belt drive.
- 19. What is crowning of pulley.
- 20. What is initial tension in belt drive?
- 21. Why gear drive is known as positive drive?
- 22. Define module.
- 23. Define gear train & types of gear train.
- 24. What is a governor? Classify governor.
- 25. Define flywheel.
- 26. Define sensitivity and stability of governor.
- 27. Define isochronisms and hunting in governor.
- 28. Define fluctuation of speed in flywheel.
- 29. Define balancing and need of balancing.
- 30. Differentiate between static and dynamic balancing.
- 31. What is vibration and state type of vibration?
- 32. Define frequency, time period and amplitude in vibration.

### LONG QUESTIONS:- (5 MARKS)

- 1. Explain different types of cam and follower.
- 2. Explain different types of kinematic pair according to relative motion between them.
- 3. Derive the expression of torque transmitted in flat pivot bearing assuming UPT/UWT.
- 4. Derive the expression of torque transmitted in conical pivot bearing assuming UPT/UWT.
- 5. Derive the expression of torque transmitted in single collar bearing assuming UPT/UWT.
- 6. Explain the working of single plate clutch with neat sketch.
- 7. Explain the working of rope break dynamometer with neat sketch.
- 8. Explain the working of prony break dynamometer with neat sketch.

- 9. Define bearing and explain different types of bearing.
- 10. Determine the maximum and average pressure in a plate clutch when the axial force is 4KN. The inner radius of the contact surface is 50mm and outer radius is 100mm. Assume uniform wear condition.
- 11. The pitch of 50mm mean diameter threaded screw of a screw jack is 12.5mm. The coefficient of friction is .13 between nut and screw.(i) determine the torque required to raise the load 25KN(II)determine the ratio of torque required to raise the load to lower the load.(iii)efficiency of screw jack.
- 12. The mean diameter of square threaded screw jack is 50mm. The pitch of the thread is 10mm. The coefficient of friction is 0.15. What is the force must be applied at the end of a 0.7m long lever, which is perpendicular to the longitudinal axis of screw to raise a load of 20 KN and to lower it?
- 13. A conical pivot supports a load of 20KN, the cone angle is 120° & the intensity of normal pressure is not exceed 0.3N/mm<sup>2</sup>. the external diameter is twice of internal diameter. Find the outer and inner raddi of bearing surface. If the shaft rotates at 200 RPM coefficient of friction is 0.1.find the power absorbed in friction. Assume UPT.
- 14. Explain different type of belt drive with neat sketch.
- 15. Derive the expression for length of open belt drive.
- 16. Derive the expression for length of crossed belt drive.
- 17. Derive the expression for length of crossed belt drive.
- 18. Derive the expression of ratio of belt tension in flat belt drive.
- 19. Derive the expression for maximum tension in belt drive.
- 20. Derive the expression for centrifugal tension belt drive.
- 21. State the advantages & disadvantages of v–belt drive over flat belt drive.
- 22. Derive the formula for centrifugal tension in belt drive.
- 23. Find the power transmitted by a belt running over a pulley of 600mm dia at 200 RPM. The coefficient of friction between belt and pulley is 0.25, angle of lap 160° & maximum tension in the belt is 2500N.
- 24. Derive the velocity ratio for compound gear train.
- 25. Explain gear train & different types of gear train with neat sketch.
- 26. Differentiate between flywheel and governor.
- 27. The mass of flywheel of an engine 6.5tonnes and the radius of gyration is 1.8m.it is found that the fluctuation of energy is 56kN-m, if the mean speed is 120 RPM find the maximum and minimum speed.
- 28. Explain the working of centrifugal governor with sketch.
- 29. A porter governor has equal arms each 250mm long attached to the axis of rotation. Each all has a mass of 5 kg & mass of central sleeve is 25kg.the radius of rotation of the alls is 150mm when the governor begins to rise and 200mm at its maximum speed .find the minimum and maximum speeds range of speed of the governor.
- 30. Derive the natural frequency of free longitudinal vibrations using equilibrium method.
- 31. State the causes and remedies of vibrations.

### LONG QUESTIONS :- (10 MARKS)

- 1. Explain the inversions of four bar chain mechanism with sketch.
- 2. Explain the inversions of single slider crank chain mechanism with sketch.
- 3. Two pulleys, one 450mm dia & other one 200mm dia are on parallel shaft1.95m apart are connected y crossed belt drive. Find the length of the belt and the angle of contact between belt & each pulley. How much power can e transmitted by the belt when larger

pulley rotates at 200rev/min, if the maximum permissible tension in the belt is 1 KN, and the coefficient of friction between belt and pulley is 0.25?

- 4. A shaft rotating at 200 RPM drives another shaft at 300 RPM and transmits 6 KW through a belt. The belt is 100mm wide and 10mm thick. the distance between the shafts is 4m. The smaller pulley is 0.5 m in diameter. calculate the stress in the belt ,if it is i) open belt drive ii) crossed belt drive. take  $\mu$ =0.3.
- 5. A pulley is driven a flat belt ,the angle of lap is  $120^{\circ}$  .the belt is 100mm wide and 6mm thick and density is  $1000 \text{kg/m}^2$  .if  $\mu$ =0.3 maximum stress does not exceed Mpa . Find the greatest power which the belt can transmit and the corresponding s peed of belt.
- 6. A porter governor has equal arms 250mm long and pivoted on the axis of rotation. Each ball is 5kg and mass of central load is (sleeve) is 25 kg. The radius of rotation of the ball is 150 mm when the governor begins to lift and 200mm when the governor is at maximum speed. Find the maximum and minimum speed and range of speed of governor.
- 7. Four masses m1,m,m3 & m4 are 200kg,300kg,240kg&260kg respectively .the radius of rotations are .2m,0.15m,0.25m & 0.3 m respectively .the angles between successive masses are 45°,75° & 135°. Find the position and magnitude of the balancing mass is the radius of rotation is 0.2m.use analytical and graphical method. Assume all the four masses are rotating in same plane.

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3. Define abrasive. 4. How size of a planer à specified 5. Depine Broaching. 6. What do you mean by emulsion. 7. Défferentiate betur colants and lubricants. 8. Define speed, Feed and depth of cut 9. What is the difference between vertical shaper and slotter. 10. Défine grinding wheel. 11. Define boring 12. Give the composition of high speed steel. 13. What is Lapping. 14. How the size of planer is specified.

### 15. What is the significance of quinding. 16. What is the quality of tungsten. J. 17. Define bond.

### Long Question (5 marks) 1. Name various cutting tool materials. Briefly clesvribe one important tool material along withits characteristics. 2. List various hand tools and discuss their witing action.

B. What is the difference betw capstan and a torover lathe.
4. Explain the onanopacturing process of a guinding wheel.
5. Describe the construction of a simple dividing head.
C. I is the automatic table feed mechanism

## 6. Explain the automatic table feed mechanism in shaper. 7. Explain different types of broaching operations and their applications. 8. Describe in the brief the main parts of planer.



# Long Question (10 marks) 1. Describe varior pagits of Lathe machine along with explain its working. 2. Desoribo the quick return mechanism use in shaper with a neat sketch.

- 3. Des ouibe quit, quade and structure of a grunding wheel. Explain grunding operation 4. Deraw a single point witting tool showing different angles and parts dequired for
  - toil nomenclature.
- 5. With a diggeran explain the construction and working of a radial duilling machine 6. Describe the various mechanism for table

# drive in planer. + Draw a neat sketch of a milling cotter and explain it's different parts. 8. Give a shoret note h: a Sopenfinishing (b) Lapping



Question Bank 4th somester, Mechanical Enge Fluid Mechanics Shart Questions; Define mass density of Gland What is specific weight of Genid ? 3 Define about specific gravity of any filmid. I Waite down about specific values of blind (5) What do you mean by viscosity 2 @ State Newton's law of iscasing for Gland Define Dynamic viscosity and write its const. (8) What is Kinematic viscosity and what is the with (9) Define about compressibility of any filmed (1) Define surface tension and write the write (1) Write down the capillary head of any liquid and also the unit (12) What do you mean by ideal Glaid? (13) What is real (shrid? (14) Define about Newtonian (Inid [] What do you understand by Non-Newtonian (Indi (6) Define about Clinic pressure [1] What is intensity of preserve of almid and white its whit [8] Define about pressure head along with the unit for any folmed 19) Stare Pagcal's law of lignid (20) Defire about atmosphenic pressure 21) What do you mean by positive gauge pressure 29) Defire about Absolute pressure. (23) Write the methematical expression involving absolute pressure, atmospheric pressure and vacuum pressure. 24) Why piezoneter is used 2. 25) What for menometer is utilized? 26) When do we measure by using differential

) Dote \_\_\_\_\_ manometer 2 Why Boundon's tube pressure gauge is used? 27) 28) Define about hydrostectic pressure of folmid (29) What do you meen by total pressure and its whit 2 (30) Define centre of pressure along its writ State Anchémedes principle fon blinial 313 (32) Define about Buoyency of anid (33) What do you mean by metacentre of a body immorsed in filmid? Define about mosacentric height and 34) jos cronit (35) Define about uniform flow and non-whitrom flow 36) What do you mean by steady ( low and wistedy ( dw? (3) What do you understand by the streamline place and rembulant flow of any filmed 2 (38) Define the notational flow and Enotational flow (39) Define about the compressible flow and incomposite blow of any blind (40) Define the one-dimensional (low, two-dimensional ( dow and three - dimensional flow of any find (41) State the contribuility equation for me-dimensional blow of any liquid (42) State the Bennoulli's equation (an highid (dow (43) Give examples of any two applications of Benormili's equation 443 Why venturimeter is used 2 45) What is the puppose of using pitot tabe 469 Why onlice is used 2 42) Delive about the term venacontracta 48) Write down the most matical equation 600 theoritical discharge through crifice P-2

(99) Why notch is wed and do defire about 50) Why wein is used and write down about the material of arein. Define about pipe. on energies Define about loss of energy in pipe Defire about Hydraulic gradient live What do you mean by Total gradient energy line ? (55) What do you mean by impart of jet? (56) Write down the condition for maximum ellipting impact of jet on a series of vanes 5) Write down about the surface tension and capillary effect of any which (58) A container having volume of 4m3 contains all having weight equal to 30,000 N. End at the specific granty of the cil 59) Find not the capillary elthert of a glass the of your diabases when interred in water and mencury. The surface tension for water and the are 0.0735 N/m and 0.51 N/m nepecticity. The contact copples for anter and nerowing ane 0° and 130° nespectively Explain about simple manneter in details ED Explain about differential manameter 52 Endain chait Bandon's take pressure gauge 63) Calculate the height of a water column equilater to a pressure of 150000 N/m2 649 A simple menometer contriving the is used to necrup water preserve flowing in a pipe. The Hy level in the gren tabe is so man higher the

that on the left tabe. It water left the is then find the pressure where po A dildenomial monometer connected as the tac pint A and B at the same level in a pipe cartaining on all of specific gravity as tous a differential in the land og loch. Calculate the pressure difference at two prints. Denive the equation for total pressure immensed surface Derive the most provide equation to find at the trade pressure on vertically impressed surface in lignit (68) Derive the madematic equation from contra parssure on horizontally insured sails (69) Derive the equation to find at the centre of pressure on vertically immersed enjoye (10) Englain about (clotestin and write as a the conditions of equilibrium for dearing here 2) A tank 3my um contains 1-2 m deep al hang specific gravity 0.8. End out the interring of pressure at the tank base and total pressure on the tank bare (22) An isosceles tricogalas plate de are 30 with altitude 3m is imposed vertically in later such that the page touches the free surface of Calculate the total pressure and come d of the plate [23] State Continuity equation and also procee in las me dimensional (doce Pasove the Bennoulli's equation or down the limitations 23 Epplain about venturinester and the mathematical equestion (on discharge P-4

(76) Explain about Pitat table and denie the mostematical equation for velocity of light of thow where it is used 2) Water is flowing through a give of locin demonstra with an average velocity of com/s. Calenbore the nose of discharge of water and the velocity of water at the other and of the pipe. The diameter of the pipe is gradually charged to soo min (28) The diameter of a pipe charges from 200 mm at a relation 5 m above datum to somm at a seltion 3m above datum. The water preisure at the 12 selation is strong the velocity of blow at the same section is imis, calculate the pressure intensity at the second section A venturimeter with 150 mm diameter at inlet and to cm at the threat is in horizontal direction and all having specific gravity 0.9 flows through it. The all-mencary differential monomeses shows a gampe difference of 200 mm The coefficiente de ventrunineses is 0.98. Calendate the discharge of oil 80) White down about different types of onlikes and explain about ( dow through and ice (8) Eplain about di literent hydraulic coelpicients of onfice and denire the mothematical equation between Cc, CV and Cd (82) White down about different type de notes with proper ligner. 83 Denire the mathematical equation (on discharge over rectangular note). 84) Derive the equation for discharge over talangular notch. (P-5)

(85) Explain with (righter about discherent types of weins A 60 mm dramater online is discharging water 86) under a bead of 9m. Calentate de actual discharge through the militice and actual velocity of jet at vena contracta, Given, Cd = 0.625, Cv = 0.98 Also Good out Cc (87) A night aggled v-north was used to measure the discharge. The water depth at the v-north is 200mm. Calqulate the discharge over the notch Given, coeldpicients of discharge = 0.62 (88) A rectangular aich of 4.5 m long has a 300 mm head of water. Caladone the discharge over the wein sile coelshicient of discharge = 0.6 (89) Explain about dillorenent types of loss of energies in pipes and write down Darry's (scrimula and chezy's (commuta for head loss. (90) Find the loss of head due to priceion, in a pipe of 500 mm diameter, 1.5 km long. The water velocity in the pipe is I'm's. The coefficient of fraitarian is 0.005. (91) A town having a population of 100000 is to be supplied with water from a reserving at 5 km. distance. The 50% of the daily supply of 150 It head are delivered within 8 bry. Find the size of the pipe to franch the supply sig the head available is 12m. Take c=45 (Chezy's (comula) (92) Epplain about the impact of jet on ventical fixed plate 93) Epplain about jet impact of jet on versical monthy plate. (94) Endain about the impact of jet on a series (P-6'

of vones. Find out the analogoe elficiency and the condition of me and effaciency (15) Epplain about the impart of get fired comed yours Eplain in describ doort for int making council some with velocity toring A jet of anon of some harrow it had Water under a conterne read of the Calculate the force events by the work on a final place Asome, Cuesan (8) A water jet so mm in danster mange at a velocity of 15 m/s implaces on a series of vonce moving with a volacity of som calculate the pace exerted in the or a 2 me by the jet and eldicency in the 99) A water jet with your a comment a feel curred vane with velocity of som the an est of 20° with the horizontal End the round tengential forces evented by the jet leaves the vare at angle of 15° to de hand [00] A wave jet having relacion of home infine on a crosed vare and vore is make at 25% The water jet enters the vore at so with the direction of jew the approx leaves the date noonally to the mation of the varies when here inlet and awfet velocity to angle and ete vare andes las no shock at every and en The relative velocities at the andat so be as to the relative velocity at salet Prepared By: - Sachidmonte Path Letterer (rechand see (R-7) Gister - Calor Star

Question Bank Subject -> Theremal Engineering -11 Breanch -> Mechanical Engg. Sem 7 4th 2 mariks questions: > Define 10 engine. 2 Write name of the parameters used to measure periformance of 10 engine. 37 Define mechanical efficiency. 45 What is indicated thermal efficiency? 3> Define brake thermal efficiency. 6> Differentiate between IP & BP. 77 Define Stc. 8> Define MEP. Differentiate between bsfc & 1sfe. 9> 10> Define calorific value of fuel. 11> Define Ain-fuel Matio. R> Write functions of air compressor. Differentiate between single acting & double 13> acting air compressor. Differentiate between single stage & double 14> multi stage air compresson, 157 Define clearance volceme. Define compression reactio. 16> Define volumetric efficiency. 177 187. Define Free Ain Delivery. 19> What do you mean by prressure reaction ? Differentiate between gas & voupour 204

Differentiale between sensible heat & latent 217 heat. Define satimated Steam. 22) Define dryness freaction. 237 what is supercheated steam? 247 Write the function of boiler. 25> Define draught. 267 classify draught system. 17> Give examples of 4 boster mountings. 28> what is boiler accessorcies? Give 2 rexamples. 29> Define SSC. 107 Define work ratio. Draw P-V diagram foi lanvine yele. Draw T-S d'agream for lankine ycle. 137 State Fourcieri's law of heat conduction y/ State Newton's law of cooling. 157 Stale Stefan Bolizman's Law of regulation black body. Define 17> Define emissivity.

11>

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36>

52	marche questions : >
1>	Write about the industrial cues of comprised
7.	aire.
$\prec >$	Explain working of single stage single adming
2	ain complement.
07	Derrive the emporension for workdore of single
	Stage aire compressor without clearance.
4>	Explain how steam is formed step by step.
5>	Represent formation of steam in P-V &
	T-s dragream.
6>	Explan Molbier chart.
77.	what is boilers? classify boilen.
85	Compare between water tube & fire tube
	boilen.
2>	Define dreaught.
tox	classify draught system.
9>	Differentiale between boiler mountings of
1	boiler accessorciel
103	Represent cannot cycle in P-V & T-S diagram.
ny	Explain reheat, cycle.
127	Explain Regenerative Romkine Lycle.
13>	Explan different modes of hear transfer.
14>	Explan sciriface reflectivity absorptivity
	treams miss i bility.

Property has a plan print

10 marche questions : > > Explain working of cochran boiler with diagram. Explan working of Lancashire boiler with 27 diagnam. Explain working of Babcock & wilcox boiler 3) with near diagream. What is draught? Explan different types of draught events 45 draught system. 5> Explan cannot cycle & derive the expression to find its efficiency. A Rankine ydle works between boilen præsene 67 of 30 bar & condenser pressure of 0.1 bar. Steam being dry saturated at the turkine entry And thermal efficiency of the cycle. 77 A ideal Plankine cycle is supplied with saturated steam at boiler pressure of 50 bar to the. turbine. It is expanded to a condenser pressure of 0.02 barr. Determine a) Efficiency b) Heat supplied to the bosten c) Heat rejected into the condenser d) work reation al drafter for 2) 220