	Paper ID: 140501	(Following Paper I	Printed Pages : 6
B.Tech.	Roll No.	Following Paper ID and Roll No. to be filled in your Answer Book)	569
		be filled in your	NME-501

(SEM. V) THEORY EXAMINATION, 2015-16

MACHINE DESIGN-I

Maximum

|MaximumMarks: 100

Time: 3 hours]

Note: Attempt all sections (A, B and C)

Section-A

Attempt all parts, All sections carry equal marks. Write answer of each section in short. (10×2=20)

(a) List the factors that influence the selection of

materials for specific application.

What is ergonomic consideration in design?

(c) Why Wahl's correction factor is used in spring

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- <u>a</u> Why preferred numbers are important in machine
- <u>@</u> Why fatigue failure of materials is important while designing machine part?
- Э Why efficiency of screw jack should not be more

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- <u>@</u> Why most of the components are designed for infinite life?
- Ξ Why repeated stresses are crucial in ductile
- What is rated life of a system?

List components designed for finite life.

Note: Attempt any five questions from this section. Section-B

10×5=50

ģ (a) What are preferred numbers in design?

A manufacturer is interested to start a business with kW. Specify power capacity of six models. six models of machines ranging from 7.5 kW -75

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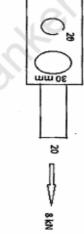
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æ What do you understand by i) FE320 ii) FeE 200

w

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- steel i) carbon= 30-40%, Si=0.8-0.9%, Mn=0.7-How will you designate the following varieties of 0.9%, Cr=3.5-4.5%. ii) C=45-55%, Cr=18%
- (a) A rectangular bar made of carbon steel 40C8 is subjected to a tensile load as shown in fig 1.0. being 3mm (aal dimensions in mm). Calculate the max stress in the bar with fillet radius



(b) A cylindrical bar made of Fe620 is ssubjected to safely of 2.0 combined bending moment and to torsional Determine the diameter of the bar for a factors of moment of 10kN-m & 30kN-m respectively. www.FirstRanke.

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(5)

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æ A stepped shaft, stepped from 40 mm to 30 mm is max stress in the shaft? the stress concentration at fillet is 2.3, what is the subjected to a torsional moment of 100 N-m. If

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- ਭ A machine components is subjected to a bending. stress varying from 300 MPa to -150 MPa. Calculate the minimum required ultimate strength,
- if the factor of saftey is 1.5
- (a) friction. Differentiate between collar friction and thread

6

- 9 Design a triple riveted butt joint for a boiler of of 1.5mPa. 1.2m inner diameter operating at a steam pressure
- components. Assume any missing data Design a protected type flange coupling to transmit 135 kW @ 120 rpm. Assume 40C8 as material for all

7.

of 1.5. The material of the spring may be selected as the spring for a spring index of 6 and a factors of safety subjected to varying load from 600N to 1000N. Design A helical spring made of oil tempered carbon steel music wire.

principal stresses and buckling failure. Design the screw of a screw jack to lift a load of 95 kN through a height of 250 mm. verify the design using

Section-C

Attempt any two questions from this section.

(2×15=30)

(a) Distinguish between shaft axle and spindle. Design a shaft to transmit 25 kW @ 200 rpm supported between bearings 1.0 m apart. Allowable carying a central load of 900 N and is simply tensile and shear stresses for material are 56 & 42

MPa respectively.

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to a combined bending & torsional moments -30 MPa to +30 MPa and -15 MPa to +30MPa respectively.

corrected endurance strength of 200 N/mm2 is subjected

Calculate the factors of safety.

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moment of +440 Nm to -220 Nm and a torsional moment of 330 Nm to 110 Nm. Shaft is of no varying cross-section. Determine the required shaft diameter. If the material has ultimate tensile and yield strength of 550 N/mm² and 440 N/mm² with a factor of safety of 1.5.

12. A cylindrical steel shaft of ultimate and yield strength of 580 & 360 N/mm² respectively and a cylindrical

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A hot rolled steel shaft is subjected to a variable bending

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