Code No: RT22013 **R13** SET - 1

II B. Tech II Semester Supplementary Examinations, Nov/Dec-2016
STRENGTH OF MATERIALS - II
(Civil Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART –A **[22M]**

1. a) Define the terms principal planes and principal stresses.
   b) What is a spring? Name two important types of springs.
   c) What are the limitations of Euler's theory?
   d) What is the middle quarter rule for circular section?
   e) Differentiate between symmetrical and unsymmetrical bending.
   f) What are the assumptions made in the analysis of a simple truss?

PART –B **[3×16=48M]**

2. a) Derive an expression for a member subjected to direct stress in one plane.
   b) Define and explain the maximum shear strain theory of failure.

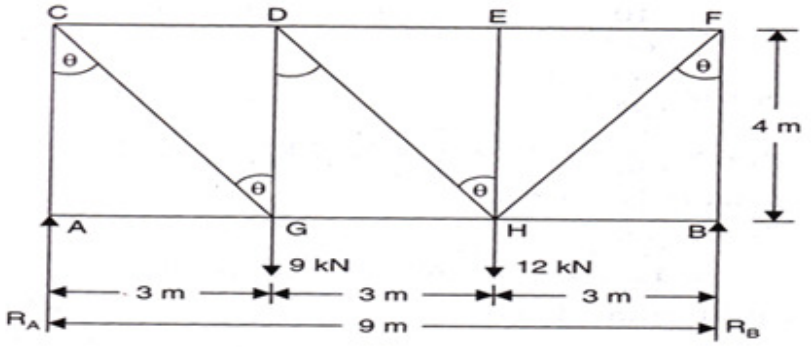
3. Derive the expression for the maximum bending stress developed in the leaf spring and also the central deflection of a leaf spring.

4. a) Derive the equation for the Euler's crippling load for a column with both ends hinged.
   b) What is Prof. Perry's formula?

5. a) A hollow rectangular column is having external and internal dimensions as 140cm deep x 100 cm wide and 100 cm deep x 60cm wide respectively. A vertical load of 220kN is transmitted in the vertical plane bisecting 140 cm side at an eccentricity of 10cm from the geometric axis of the section. Calculate the maximum and minimum stresses in the section.
   b) What do you mean by direct stress and bending stress?

6. Determine the stresses and deflection at the midpoint of a channel section by unsymmetrical method. Also identify the position of the neutral axis.

7. Find the reactions in the members by method of joints.



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Code No: RT22025 **R13** SET - 1

II B. Tech II Semester Supplementary Examinations, Nov/Dec-2016
ELECTRICAL MACHINES - II
(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART – A

1. a) Derive an expression for emf equation of single phase transformer. (4M)
   b) What are the necessary conditions for conducting O.C and S.C tests (4M)
   c) What is the need for Star/Delta transformer? Explain briefly. (4M)
   d) What is slip speed? A 3-phase, 4-pole, 50Hz induction motor is running at 1440 rpm. Determine the slip speed. (4M)
   e) List different starting schemes for a squirrel cage induction motor. (3M)
   f) Define the specific electric loading and magnetic loading (3M)

PART – B

2. a) State and prove the condition for maximum efficiency of transformer. (8M)
   b) A 100KVA, 1-phase transformer has full load primary current of 400A and total resistance referred to primary is 0.006. If the iron loss amounts to 500W, find the efficiency at full load and half load at (8M)
   (i) Unity power factor and (ii) 0.8 power factor.

3. a) A 240/120V, 12 kVA transformer has full-load unity pf efficiency of 96.2%. It is connected as an auto-transformer to feed a load at 360V. What is its rating and full-load efficiency at 0.85 pf lagging? (8M)
   b) A 120 KVA, 2000 / 200V, 1 phase transformer takes a current of 50 A and 2400 W at 100V when the low voltage winding is short circuited. Determine the load voltage and % regulation when delivering full load current at 0.8p.f lagging, the supply voltage being 2000V. (8M)
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4. a) What are the advantages of three-phase transformers over single-phase transformer units? (6M)
   b) Explain the implementation of three-phase Star/Star and Star/Delta transformers. Also list their applications. (10M)

5. a) What is meant by stand still reactance of induction motor rotor? How does it vary with speed? (6M)
   b) Draw the phasor diagram of an induction motor showing applied voltage, magnetizing, coreloss, load current and the line current. Label each component. (10M)

6. a) Show that the maximum torque occurs at a slip $s = \frac{X_2}{R_2}$ and further show that T_{max} is independent of s. (8M)
   b) What is cogging? How to eliminate cogging? (4M)
   c) What is crawling? Explain briefly. (4M)

7. a) Write and explain the output equation of a transformer. (6M)
   b) The current densities in the primary and secondary windings of a transformer are 2.2 and 2.1 A/mm^2 respectively. The ratio of transformation is 10:1 and the length of mean turn of the primary is 10 per cent greater than that of the secondary. Calculate the resistance of the secondary winding given that primary winding resistance is 8 Ω. (10M)

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Code No: RT22035 **R13** SET - 1

II B. Tech II Semester Supplementary Examinations, Nov/Dec-2016
MACHINE DRAWING
(Com. to ME, AME, MM)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answer **TWO** question from **Part-A**
3. **Part-B** is compulsory

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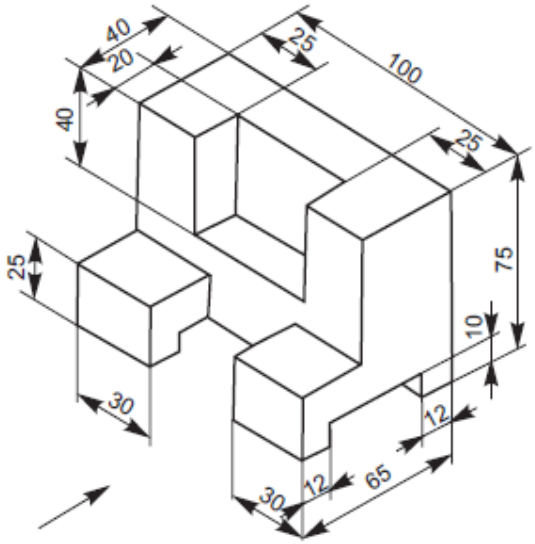
PART –A

1. a) Draw (i) the view from the front, (6M)
(ii) the view from above and
(iii) the view from the left of the object shown in Figure.



b) Sketch the following (5M)
(i) Castle nut (ii) Lock nut (iii) Square nut

2. Draw (a) sectional view from the front and (11M)
(b) view from the side of a universal coupling, indicating proportions, to connect two shafts, each of diameter 40 mm.

3. Draw (a) sectional view from the front and (11M)
(b) view from above, of the double riveted, double strap, zig-zag butt joint to join plates of thickness 10 mm.

PART –B

4. The part drawings of air cock are shown in Fig. Assemble the parts and draw, (48M)
(a) Sectional view from the front and (a) view from above.

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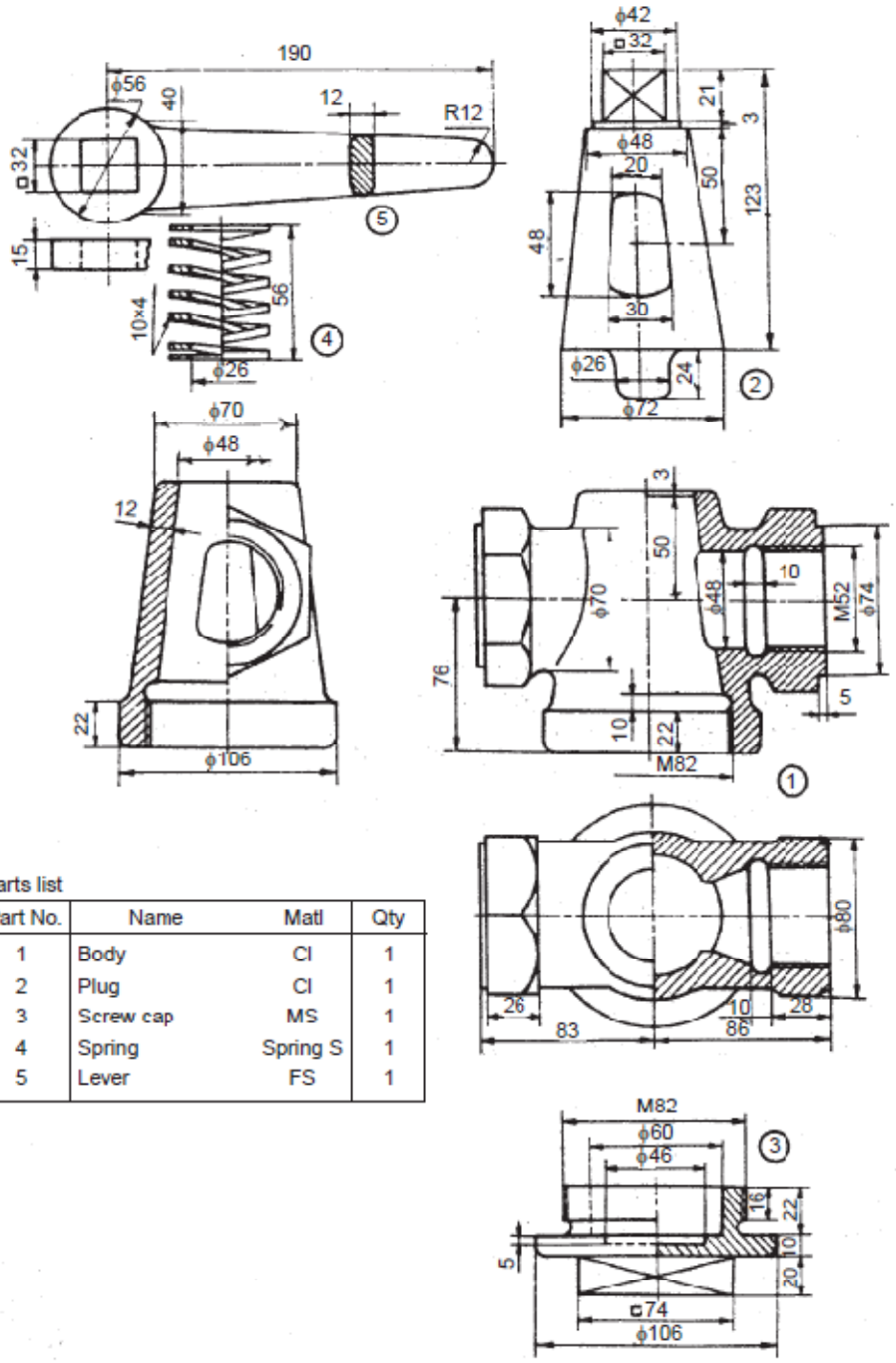

Parts list

Part No.	Name	Matl	Qty
1	Body	CI	1
2	Plug	CI	1
3	Screw cap	MS	1
4	Spring	Spring S	1
5	Lever	FS	1

Air cock

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Code No: RT22042 **R13** SET - 1

II B. Tech II Semester Supplementary Examinations, Nov/Dec-2016
RANDOM VARIABLES AND STOCHASTIC PROCESSES
(Electronics and Communications Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART-A

1. a) What is a Random variable? Explain different types of Random variable
   b) What is Transformation? Classify the different types Transformation of Random Variable
   c) Write properties of Joint Density Function
   d) Write the properties of Autocorrelation Function of Random Process
   e) Write the properties of power density spectrum
   f) A white noise X(t) of psd $N_0/2$ is applied on an LTI system having impulse response h(t). If Y(t) is the output find $E[Y^2(t)]$

PART-B

2. a) A random current is described by the sample space. A random variable X is defined by

$$X(i)=\begin{cases}-2 & i\le -2\\ i & -2<i\le 1\\ 1 & 1<i\le 4\\ 6 & 4<i\end{cases}$$

   Show, by a sketch, the value X into which the values of i are mapped by X.
   What type of random variable is X?
   b) Explain Gaussian random variable with neat sketches?

3. a) A random variable X can have values -4, -1, 2, 3, and 4, each with probability 0.2. Find (i) the density function (ii) the mean (iii) the variance of the random variable $Y= X^2$.
   b) Find the expected value of the function $g(X)=X^3$ where X is a random variable defined by the density

$$f_X(x)=\left(\frac{1}{2}\right)u(x)\exp(-x/2).$$
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4. a) Define random variables V and W by
   i) V=X+aY
   ii) W=X-aY
   Where a is real number and X and Y random variables, Determine a in terms of X and Y such V and W are orthogonal?
   b) Gaussian random variables X and Y have first and second order moments m_{10}=-1.1, m_{20}=1.16, m_{01}=1.5,m_{02} =2.89,R_{XY}=-1.724. Find C_{XY}, ρ?

5. a) Let X (*t*) be a stationary continuous random process that is differentiable. Denote its time derivative by $\dot{X}(t)$. Show that $E\left[\dot{X}(t)\right] = 0.$
   b) A random process is defined by X(*t*) = A, where A is a continuous random variable uniformly distributed on (0, 1). Determine the form of the sample functions, classify the process

6. a) Derive the relationship between cross-power spectrum and cross-correlation
   b) A random process is given by $X(t) = A\cos(\Omega t + \theta)$ where A is a real constant, Ω is a random variable with density function $f_{\Omega}(\Omega)$ and θ is a random variable uniformly distributed over the interval (0, 2π) independent of Ω. Show that the power spectrum of $X(t)$ is $S_{XX}(\omega)=\frac{\pi A^2}{2}[f_{\Omega}(\omega) + f_{\Omega}(-\omega)]$ and also find P_{YY}.

7. A random noise X(t), having a power spectrum
$$S_{XX}(\omega) = \frac{3}{49+\omega^2}$$
is applied to a differentiator that a transform function $H_1(\omega)=j\omega$, the differentiator's output is applied to a network for which $h_2(t)$ =u(t)t2exp(-7t) and the network's response is a noise denoted by Y(t).Find the following
   (a) What is the average power in X(t)
   (b) Find the power spectrum of Y(t)

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Code No: R22026 **R10** SET - 1

II B. Tech II Semester Supplementary Examinations, Nov/Dec-2016
CONTROL SYSTEMS
(Com. to EEE, ECE, EIE, ECC, AE)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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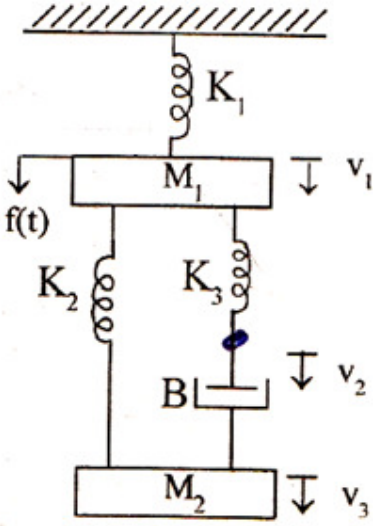
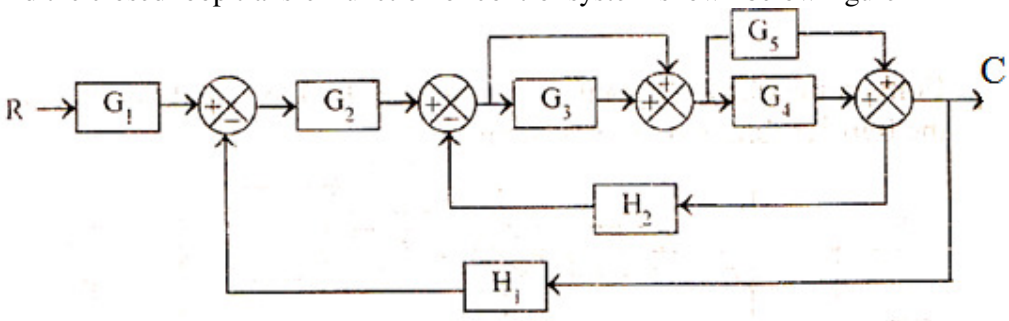
1. a) Define control system? Explain with any two examples (6M)
   b) Determine the transfer function $\frac{V3(s)}{F(s)}$,for the system show in below figure (9M)



2. a) Explain the Synchro transmitter with necessary diagrams (7M)
   b) Find the closed loop transfer function of control system shown below figure (8M)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3. a) Find the time domain specifications for a unity feedback control system whose open loop transfer function is given by $G(s)=\frac{25}{s(s+6)}$. (8M)

   b) A feedback control system is described as $G(s)=\frac{50}{s(s+2)(s+5)}$; $H(s)=\frac{1}{s}$ for a unit step, determine the steady state error constants and errors. (7M)

4. a) The characteristics equation for a certain feedback control system is given by $s^4+22s^3+10s^2+2s+K=0$. Find K which corresponds to the stable system (6M)

   b) Plot the root locus pattern of a system whose forward path transfer function is $G(s)=\frac{K(s+1)}{s(s+2)(s^2+2s+5)}$. (9M)

5. a) Derive the necessary expressions for resonance peak and bandwidth (5M)

   b) Draw the bode plot of unity feedback system having $G(s)=\frac{3}{(s(1+0.05s)(1+0.2s))}$. Determine phase margin and gain margin (10M)

6. a) Sketch the polar plot for $G(s)=\frac{1}{s(1+sT)}$. (5M)

   b) State and describe the Nyquist stability (10M)

7. a) Explain the design procedure for lead-log controller in frequency design (8M)

   b) Describe the design procedure of PID controller (7M)

8. a) Define the state, state variables and state model (6M)

   b) A system is described by the equation (9M)

$$\begin{bmatrix}\dot{x}1\\ \dot{x}2\\ \dot{x}3\end{bmatrix}=\begin{bmatrix}0 & 1 & 0\\ 0 & 0 & 1\\ -6 & -11 & -6\end{bmatrix}\begin{bmatrix}x1\\ x2\\ x3\end{bmatrix}+\begin{bmatrix}0\\ 0\\ 1\end{bmatrix}u$$

$$y=\begin{bmatrix}1 & 1 & 0\end{bmatrix}$$

Find if the system is completely observable. if not, find the mode which is not observable

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II B. Tech II Semester Supplementary Examinations, Nov/Dec-2016
MACHINE DRAWING
(Com. to ME, AME)

Time: 3 hours Max. Marks: 75

Note: Part A: Answer any TWO of the following questions:
PART-B is compulsory.
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(12.5M ×2=25M)

PART-A

1. a) Sketch the conventional representation of the following (7M)
(i) Internal threads (ii) splined shaft (iii) bearing (iv) wood
(v) concrete (vi) white metal (vii) kerosene
b) Sketch a double start square thread of pitch 5 mm and nominal diameter 50 mm. (5.5M)

2. a) Sketch neatly, giving proportionate dimensions, the eye foundation bolt of diameter 20mm. (6.5M)
b) Sketch taper sunk key in two views, as fitted in position between a shaft and the mounting. Choose the shaft diameter as 20 mm and the hub diameter of the mounting as 40 mm. (6M)

3. Draw (a) Sectional view from the front and (12.5M)
(b) view from above of the Double riveted, double strap zig-zag butt joint join plates of thickness 10 mm

PART-B

4. Details of stuffing box are given in fig 1. Assemble all the parts and draw (50M)
(a) Half sectional view from the front
(b) Top view
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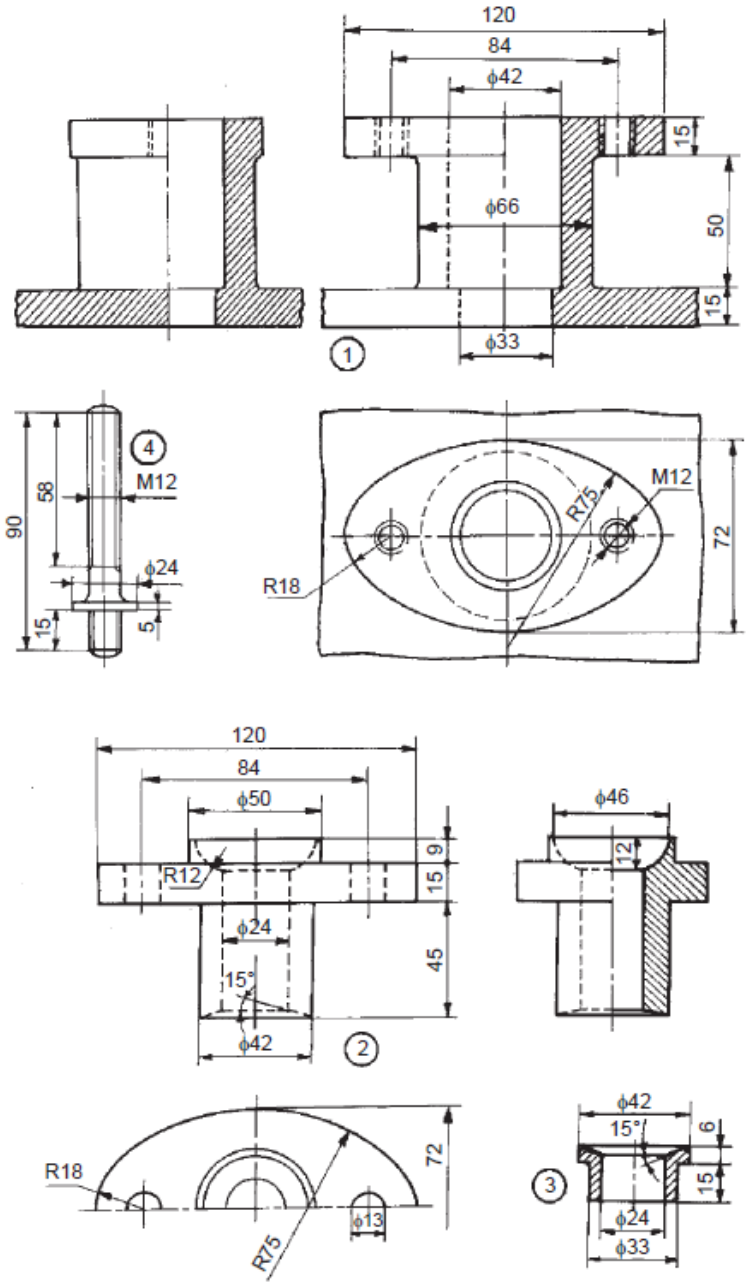

Parts list

Part No.	Name	Matl	Qty
1	Body	CI	1
2	Gland	Brass	1
3	Bush	Brass	1
4	Stud	MS	2
5	Nut, M12	MS	2

Fig. 1 Stuffing box

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