ਆਈ.ਕੇ. ਗੁਜਰਾਲ ਪੰਜਾਬ ਟੈਕਨੀਕਲ ਯੂਨੀਵਰਸਿਟੀ

(ਅਕਾਦਮਿਕ ਵਿਭਾਗ)

Ref. No.: IKG-PTU/DA/ 2144 Date : 18/11/19

ਪ੍ਰਿੰਸੀਪਲ / ਡਾਇਰੈਕਟਰ / ਫੈਕਲਟੀ ਇੰਚਾਰਜ
ਐਫੀਲੇਟਿਡ ਕਾਲਜ / ਸੰਸਥਾਵਾਂ ਅਤੇ ਖੇਤਰੀ ਕੈਂਪਸ
ਆਈ.ਕੇ.ਗੁਜਰਾਲ ਪੰਜਾਬ ਟੈਕਨੀਕਲ ਯੂਨੀਵਰਸਿਟੀ।

ਵਿਸ਼ਾ :- **ਬੀ.ਟੈਕ (ਮਕੈਨੀਕਲ ਇੰਜੀ.) ਬੈਚ 2018 ਤੀਜੇ ਸਮੈਸਟਰ ਦੇ ਨਮੂਨਾ ਪ੍ਰਸ਼ਨ ਪੱਤਰ ਭੇਜਣ ਸਬੰਧੀ।**

ਉਪਰੋਕਤ ਵਿਸ਼ੇ ਦੇ ਸਬੰਧ ਵਿੱਚ ਆਪ ਜੀ ਨੂੰ ਬੀ.ਟੈਕ. (ਮਕੈਨੀਕਲ ਇੰਜੀ.) ਬੈਚ 2018 ਸਮੈਸਟਰ ਤੀਜਾ ਦੇ ਪ੍ਰਸ਼ਨ ਪੱਤਰ ਦਾ ਨਮੂਨਾ ਇਸ ਪੱਤਰ ਨਾਲ ਨੱਥੀ ਕਰਕੇ ਭੇਜਿਆ ਜਾਂਦਾ ਹੈ। ਆਪ ਜੀ ਨੂੰ ਲਿਖਿਆ ਜਾਂਦਾ ਹੈ ਕਿ ਇਹ ਪ੍ਰਸ਼ਨ ਪੱਤਰ ਦਾ ਨਮੂਨਾ ਸਬੰਧਤ ਵਿਦਿਆਰਥੀਆਂ ਅਤੇ ਅਧਿਆਪਕ ਸਾਹਿਬਾਨ ਨੂੰ ਪੁੱਜਦਾ ਕੀਤਾ ਜਾਵੇ ਤਾਂ ਜ਼ੋ ਵਿਦਿਆਰਥੀ ਇਮਤਿਹਾਨਾ ਦੀ ਸੁਚੱਜੇ ਢੰਗ ਨਾਲ ਤਿਆਰੀ ਕਰ ਸਕਣ। ਆਮ ਜਾਣਕਾਰੀ ਹਿੱਤ ਇਸ ਪੱਤਰ ਨੂੰ ਸੰਸਥਾਂ ਦੇ ਨੋਟਿਸ ਬੋਰਡ ਉਪਰ ਚਿਸਪਾਨ ਕਰਵਾਇਆ ਜਾਵੇ ਜੀ। ਇਸ ਸਬੰਧੀ ਕੋਈ ਵੀ ਸੁਝਾਅ ਨਿਮਨ ਹਸਤਾਖ਼ਰ ਦੇ ਦਫ਼ਤਰ ਨੂੰ ਭੇਜਿਆ ਜਾ ਸਕਦਾ ਹੈ। ਆਪ ਜੀ ਵੱਲੋਂ ਭੇਜੇ ਗਏ ਸੁਝਾਅ ਸਾਡੇ ਲਈ ਮਹੱਤਵਪੂਰਨ ਹਨ।

(ਡਾ. ਬਲਕਾਰ ਸਿੰਘ)
ਡੀਨ ਅਕਾਦਮਿਕ

ਇਸ ਦਾ ਇੱਕ ਉਤਾਰਾ :

1. ਇੰਚਾਰਜ ਸਕੱਤਰੇਤ : ਮਾਨਯੋਗ ਉਪ ਕੁਲਪਤੀ ਜੀ ਦੀ ਜਾਣਕਾਰੀ ਹਿੱਤ।
2. ਡਾਇਰੈਕਟਰ (ਮੇਨ ਕੈਂਪਸ) ਜੀ ਨੂੰ ਸੂਚਨਾ ਹਿੱਤ।
3. ਕੰਟਰੋਲਰ ਪ੍ਰੀਖਿਆਵਾਂ ਜੀ ਨੂੰ ਸੂਚਨਾ ਹਿੱਤ।
4. ਇੰਚਾਰਜ, ਆਈ.ਟੀ.ਐਸ. ਵਿਭਾਗ ਨੂੰ ਯੂਨੀਵਰਸਿਟੀ ਵੈਬਸਾਈਟ ਤੇ ਅਪਲੋਡ ਕਰਨ ਹਿੱਤ।

(ਡਾ. ਬਲਕਾਰ ਸਿੰਘ)
ਡੀਨ ਅਕਾਦਮਿਕ

Roll No._____

[Total no. of Pages: 2]

[Total no. of Questions: 9]

B.Tech (Mechanical)
3rd Semester
Fluid Mechanics
BTME301-18
Paper ID:

Time: 3 Hours

Maximum Marks: 60

Note: This paper consists of three sections. Section A is compulsory. Do any four questions from section B and any two questions from section C.

Section A (2 marks each)

Q:1

a) How viscosity of liquids and gases vary with temperature.

b) The pressure 3 m below the free surface of the liquid is 13.72 kN/m^2. Determine its specific weight.

c) Explain stable, unstable and neutral equilibrium of floating body?

d) What is the difference between convective and local acceleration?

e) What is momentum correction factor?

f) Why triangular weir is more suitable than rectangular weir?

g) What is Weber's model? Give examples of its applications.

h) Why divergent part length is more than convergent part in venturimeter.

i) Can two stream lines intersect with each other? Explain.

j) What is importance of TEL and HGL?

Section B (5 marks each)

Q:2 The velocity of flow from a tap of 12 mm diameter is 8 m/s. Determine the diameter of the jet at 1.5 m from the tap when i) the flow is vertically downwards and ii) the flow is vertically upwards.

Q:3 Derive an expression for finding the frequency of oscillation of a floating body in terms

of its metacentric height.

Q:4 In film lubricated journal bearings, the frictional torque is found to depend on the speed of rotation, viscosity of the oil, the load on projected area and the diameter. Evaluate dimensionless parameters for application to such bearings in general.

Q:5 Find the expression for discharge per unit width between two parallel plates at distance b apart, when one plate is moving at velocity v while other one is held stationary, for the condition of zero shear stress at fixed plate.

Q:6 Water flows at the rate of 40 $litre/s$ through a reducer section $1-2$. At Section 1 the diameter and datum head are 200 mm and 6 m. At section 2, the diameter and datum head are 150 mm and 3 m. The pressure at section 1 is 294.3 kN/m^2. Determine the pressure at section 2.

Section C (10 marks each)

Q:7 Derive two dimensional continuity equation in polar coordinates.

Q:8 a) Derive an expression for the angle made by the free surface in a liquid that is subjected to both acceleration and gravitation.

b) A tall cylinder of 1 m diameter is filled with fluid to a depth of 0.5 m and rotated at a speed such that the height at the centre is zero. Find the speed of rotation

Q:9 Derive an expression for computing discharge through a venturimeter?

Roll No: .....

[Total No. of Questions: 09] [Total No. of Page :02]

Programme/Course: B.Tech (Mechanical Engineering)

Name of the subject: Basic Electronics Engineering

Subject code: BTEC305-18

Paper ID:

Time: 03 Hours **Maximum Marks: 60**

Instruction to Candidates:

1)Section - A is **Compulsory.**

2)Attempt any **Four** questions from Section - B.

3) Attempt any **Two** questions from Section - C.

Section –A **(10 x 2 =20)**

Q1

a) Solve for following conversions

$(111101)_2 = (?)_{16}$

Convert $(ABC)_{16} = (?)_{10}$

b) Define breakdown voltage in PN Junction diode?

c) Simplify and minimize the given expression: $(A + C)(AD + A\overline{D}) + AC + C$

d) What are the universal gates and why they are called so?

e) What are the characteristics of flip flop?

f) Write truth table for 3 input X-NOR gate.

g) Write differences between ideal and practical diode?

h) Give the design of common base configuration

i) Write differences between nMOS and pMOS?

j) What is the significance of digital signals?

Section – B **(4 x 5 =20)**

Q2 Explain full wave rectifier of center tapped configuration

Q3 Design D Flip flop, by detailing about excitation table, and K-Map with its logical implementation.

Q4 State and prove De-Morgan's Theorem with the help of truth table.

Q5 Design K-Map for given function

$F(A, B, C, D) = \sum m(1,2,3,4, 6,7, 8, 9) + d(0, 14)$

Q6 Derive X-OR and X-NOR gate from the universal gates.

Section – C

(2 x 10 = 20)

Q7) Explain for following:

a) Write differences between differentiator and integrator

b) Explain V-I characteristics of PN Junction diode

Q8) Explain for following:

a) Explain the common collector configurations

b) Design JK Flip Flop and also explain about the race around condition.

Q9) Discuss characteristics of ideal Op-Amp and Photo Diode.

Roll No: .....

[Total No. of Questions: 09] [Total No. of Page :01]

Programme/Course:.....

Name of the subject: Basic Thermodynamics

Subject code:BTME-305-18

Paper ID:.....

Time: 03 Hours **Maximum Marks: 60**

Instruction to Candidates:

1)Section - A is **Compulsory.**

2)Attempt any **Four** questions from Section - B.

3) Attempt any **Two** questions from Section - C.

Section –A **(10 x 2 =20)**

Q1

a) Define microscopic and macroscopic approach.
b) What are Extensive Properties? Give Examples
c) Explain the term Scavenging.
d) What is meant by Quasi-Static Process?
e) Explain the terms State, Path, and Process.
f) Differentiate between Nozzle and Diffuser.
g) Define Coefficient of Performance.
h) State the importance of Second law of Thermodynamics.
i) Define Mean Effective Pressure.
j) Explain the term Dryness Fraction.

Section – B **(4 x 5 =20)**

Q2 Compare Otto Cycle and Diesel Cycle using P-V and T-S diagrams.

Q3 Heat flows from a hot reservoir at 800 K to another reservoir at 250. If the entropy change of the overall process is 4.25 Kj/K, make calculations for the heat flowing out of the high temperature reservoir.

Q4 Explain the working of Four Stroke Petrol Engine.

Q5 Steam at 1000 kPa and 300 degree C enters an engine and expands to 20 kPa. If the exhaust steam as a dryness fraction of 0.9, make calculations for the drop in enthalpy and change in entropy.

Q6 Discuss Corollaries of Carnot's Theorem.

Section – C **(2 x 10 = 20)**

Q7) Two reversible heat engines A and B are arranged in series. Engine A rejects heat to engine B. A receives 200 KJ at a temperature of 421 degree C from the hot source while engine B is in communication with a cold sink at a temperature of 5 degree C. If the work output of A is twice that of B, Find intermediate temperature between A and B, efficiency of each engine and heat rejected to the sink.

Q8) State the Kelvin-Plank and Clausius statements of second law of thermodynamics, and establish the equivalence between them.

Q9) Draw a curve showing the variation of thermal efficiency with compression ratio. What limits the compression ratio for an engine working on otto cycle?

Roll No: ..... **Total No. of Page :03**

Total No. of Questions: 07

B Tech. (Mechanical Engineering) (Sem-3)

MACHINE DRAWING

Subject code: BTME-303

Paper ID:.....

Time: 03 Hours **Maximum Marks: 60**

Instruction to Candidates:

1. **SECTION-A is COMPULSORY consisting of NINE questions carrying TWO marks each.**
2. **SECTION-B contains FOUR questions carrying FOUR marks each and students have to attempt any THREE questions.**
3. **SECTION-C contains TWO questions carrying THIRTY marks each and students have to attempt any ONE question.**
4. **First angle projection to be used. You may assume any missing dimension.**

SECTION- A

Q1. Answer briefly :

a) Describe the Aligned system of dimensioning.

b) Define the terms limits and tolerance.

c) What do you understand by flexible coupling?

d) Draw the symbols for single butt weld.

e) Draw the sketch of five types of lines used in machine drawing.

f) What is the difference between pitch and lead of a screw thread?

g) Under what circumstances cotter joints are commonly used?

h) Draw edge and corner welding joints.

i) What is the advantage of providing protective flanges?

SECTION- B

2. Draw the two views of a hexagonal nut of nominal diameter 25mm.

3. Draw the free hand sketch of knuckle joint.

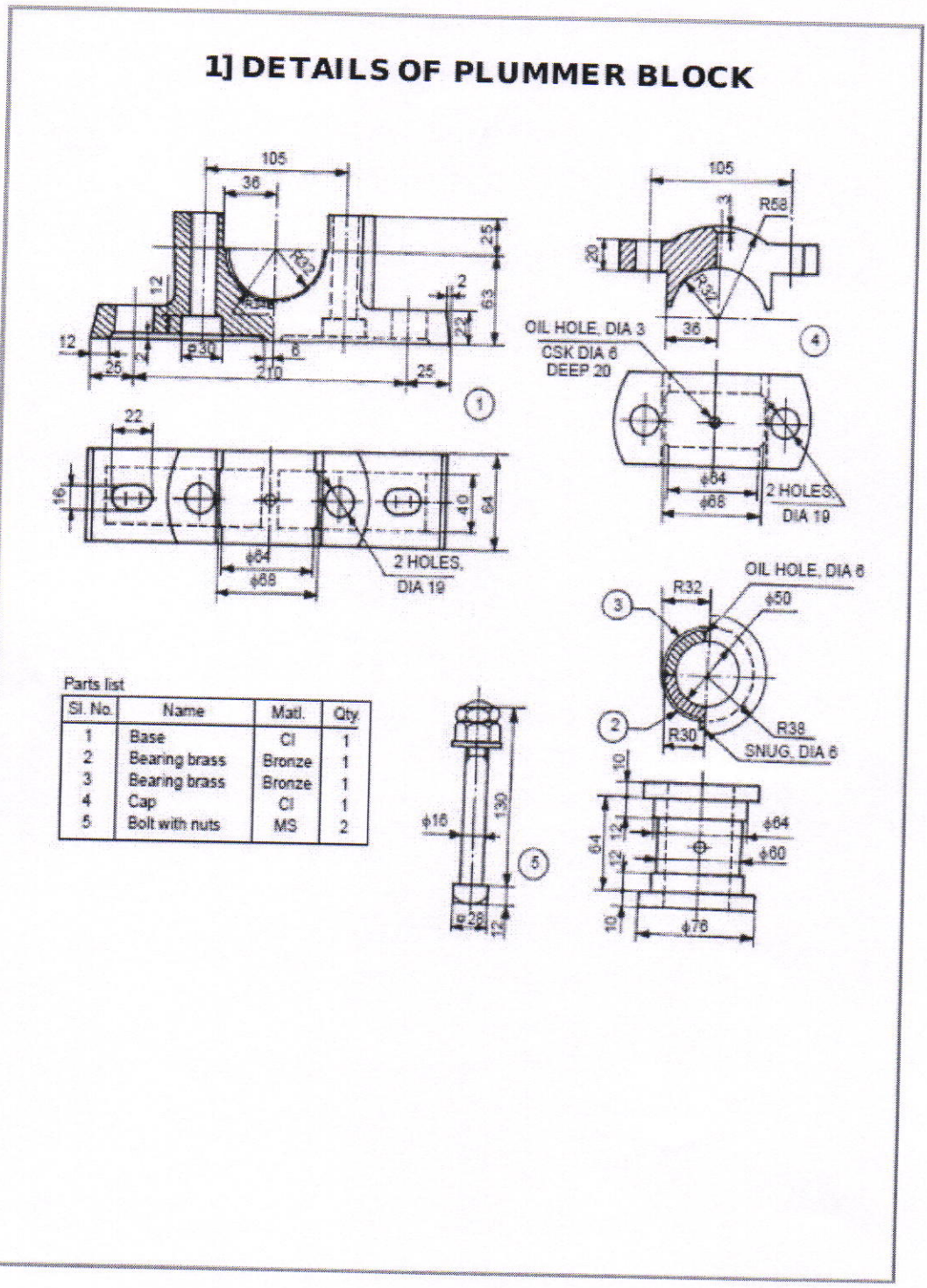
4. Draw the free hand sketch of muff coupling.

5. Sketch freehand the full sectional front view of spigot and socket joint.

SECTION- C

6. Assemble all the parts and draw the following assembled views of plumber block.

(a) Half sectional front view (b) End view

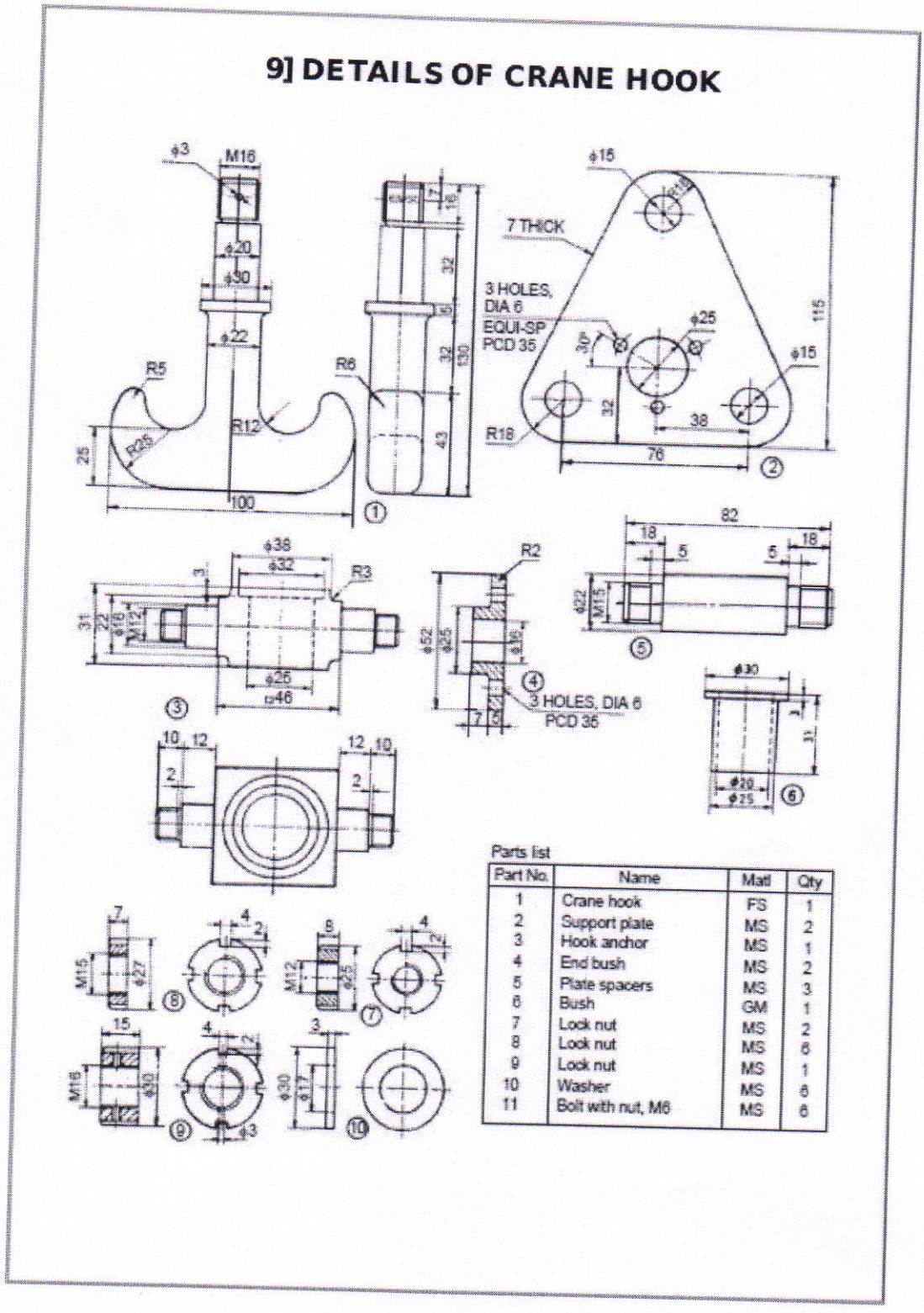


Parts list

Sl. No.	Name	Matl.	Qty.
1	Base	CI	1
2	Bearing brass	Bronze	1
3	Bearing brass	Bronze	1
4	Cap	CI	1
5	Bolt with nuts	MS	2

7. Assemble the parts of a crane hook given in Fig. 2 and draw the following views :

(a) Elevation full in section (b) Side view



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Total No. of Pages: 02
Total No. of Questions: 09

I.K.G.P.T.U. MAIN CAMPUS, KAPURTHALA
B.TECH. (3rd SEMESTER - ME REGULAR)
EXAMINATION-DECEMBER
STRENGTH OF MATERIALS- I
SUBJECT CODE: BTME 301

Time: 3 Hrs. **Max. Marks: 60**

INSTRUCTIONS TO CANDIDATES:

1. Section A is **compulsory** and it has ten questions. Each question carries **Two** marks.
2. Attempt **any four** questions from Section – B. Each question carries **Five** marks.
3. Attempt **any two** questions from Section – C. Each question carries **Ten** marks
4. Assume missing data, if any, suitably.

Section – A

Q1. **(Marks: 2 each)**

a) What is point of contraflexure?

b) What do you mean by temperature stress and temperature strain?

c) Explain principle stress and principle plane.

d) State the assumptions made in derivation of torsion equation.

e) Define section modulus.

f) What do you understand by the terms "column" and "strut"?

g) Why is prediction of deflection of beams important?

h) What do you mean by slenderness ratio?

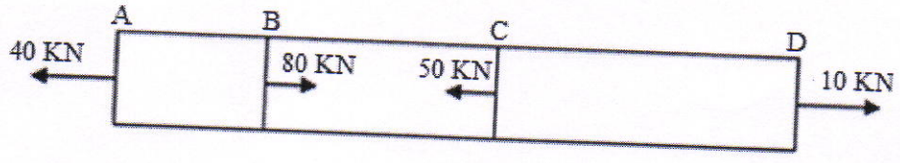
i) Show variation of shear stress along the radius of a shaft under torsional load.

j) Define shear force and bending moment on a beam.

Section – B

(Marks: 5 each)

Q2. A brass bar, having cross-sectional area of 900 mm^2, is subjected to axial forces as shown in figure. Dimensions: AB = 0.6 m, BC = 0.8 m and CD = 1 m. Find the total elongation of the bar. E= 1 x 10^5 N/mm^2.



Q3. Drive expression for slope and deflection at the free end of a cantilever beam supporting a concentrated load at free end.

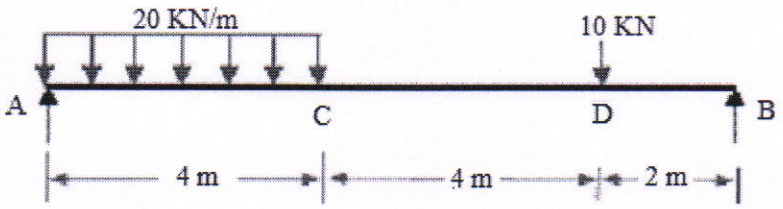
Q4. A column of timber section 15 cm x 20 cm is 6 m long with both ends fixed. E for timber is 17.5 KN/mm^2, determine: a) Crippling load and b) Safe load for the column if factor of safety = 3.

Q5. A drive shaft running at 2500 rpm has outer diameter 60 mm and inner diameter 40 mm. The allowable shear stress in the shaft is 35 MPa. Find the maximum power that can be transmitted using the shaft.

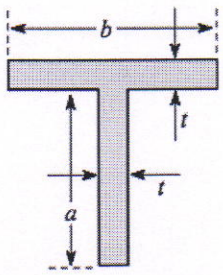
Q6. Determine the longest span of a simply supported beam (250 mm deep and 100 mm wide) that would carry a UDL of 4 KN per metre run, if the bending stress is not to exceed 12 N/mm^2.

Section – C (Marks: 10 each)

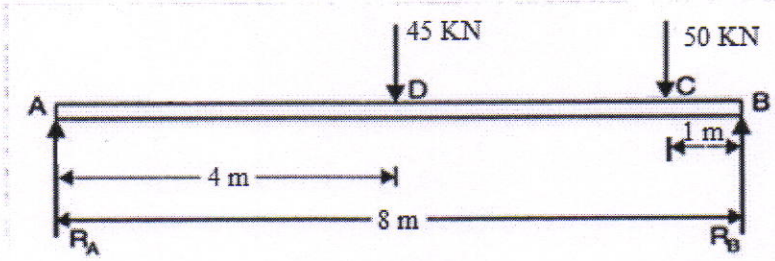
Q7. Draw SFD and BMD for a simply supported beam shown in the figure.



Q8. A moment of 3.5 KN-m is applied around the horizontal neutral axis of a wooden T- section beam (figure), inducing tension below the neutral axis. Find the stresses at the extreme fibres of the cross-section. Dimensions: a= b= 150 mm, t= 50 mm.



Q9. Calculate deflection and slope at the points under the two point loads and the maximum deflection for the beam shown in the figure when I= 70 x 10^{-4} m^4 and E = 200 GN/m^2:



Roll No._____

Total No. of Pages: 02
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B.TECH. (3rd SEMESTER – MECH - REGULAR)
EXAMINATION- SAMPLE PAPER
THEORY OF MACHINES-I
SUBJECT CODE: BTME – 302-18

Time: 3 Hrs. **Max. Marks: 60**

INSTRUCTION TO CANDIDATES:

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

Section – A

Q1. **(Marks: 2 each)**

a) Define link.

b) Explain the term kinematic chain.

c) Differentiate between 'Lower pair' and 'Higher pair'.

d) Differentiate between 'fixed' and 'permanent' instantaneous centres.

e) Explain the phenomenon of 'slip' in a belt drive.

f) What is the function of a flywheel?

g) Name the various types of brakes and dynamometers?

h) Define effort of a governor.

i) Name the various types of followers used with cams?

j) Explain the terms 'fluctuation of speed' as applied to flywheels.

Section – B

(Marks: 5 each)

Q2. Sketch and describe the working of pantograph.

Q3. Describe the principles of working of brakes of various types.

Q4. Drive an expression to determine the ratio of driving tensions for flat belt drive.

Q5. A vehicle moving on a rough plane inclined at 10° with the horizontal at a speed of 36 km/h has a wheel base 1.8 metres. The centre of gravity of the vehicle is 0.8 metre from the rear wheels and 0.9 metre above the inclined plane. Find the distance travelled by the vehicle before coming to rest and the time taken to do so when the vehicle moves up the plane. The brakes are applied to all the four wheels and the coefficient of friction is 0.5.

Q6. A machine punches 3.5cm diameter holes in a 3cm thick plate 60 N-M of work per square cm of sheared area. The punch has a stroke of 10 cm and punches one hole every 10 seconds. The maximum speed of the flywheel at the radius of gyration is 27m/sec. Find the mass of the flywheel if the speed at this radius is not to fall below 24 m/sec during each punch.

Section – C

(Marks: 10 each)

Q7. A cam drives a flat reciprocating follower in the following manner : During first 120° rotation of the cam, follower moves outwards through a distance of 20 mm with simple harmonic motion. The follower dwells during next 30° of cam rotation. During next 120° of cam rotation, the follower moves inwards with SHM. The follower dwells for the next 90° of cam rotation. The minimum radius of the cam is 25 mm. Draw the profile of the cam.

Q8. A Proell governor has equal arms of length 300 mm. The upper and lower ends of the arms are pivoted on the axis of the governor. The extension arms of the lower links are each 80 mm long and parallel to the axis when the radii of rotation of the balls are 150 mm and 200 mm. The mass of each ball is 10 kg and the mass of the central load is 100 kg. Determine the range of speed of the governor.

Q9. A bicycle and rider of mass 90 kg are travelling at the rate of 15 km/hr on the level road. A brake is applied to the rear wheel which is 0.70 m in diameter and this is the only resistance acting. How far will the bicycle travel and how many turns will its wheel make before it comes to rest? The pressure applied on the brake is 100 N and $\mu = 0.06$.