F 3521 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2016

Third Semester

Branch : Aeronautical/Mechanical/Production/Naval Architecture and Ship Building Engineering

AN 010 303/ME 010 303/PE 010 303/ST 010 303—FLUID MECHANICS [AN, ME, PE, ST]

(New Scheme—2010 Admission onwards)

[Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*
Each question carries 3 *marks.*

1. Differentiate between absolute pressure and guage pressure.
2. Define 'energy correction factor'.
3. What do you mean by 'hydraulic radius' ?
4. Discuss the characteristics of spiral flow.
5. List a few methods for preventing separation of boundary layer.

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*
Each question carries 5 *marks.*

6. Prove that the relationship between surface tension and pressure inside a droplet of liquid in excess of outside pressure is given by $p = 4\sigma / d$.
7. Obtain an expression for discharge through a large rectangular orifice.
8. Explain the phenomenon of water hammer.
9. Discuss Uniform flow with source and sink.
10. Derive an expression for energy thickness.

(5 × 5 = 25 marks)

Turn over

Part C

Answer **either** *(a)* **or** *(b) of each question.*
Each full question carries 12 *marks.*

11. (a) If the velocity profile of a fluid over a plate is a parabolic with the vertex 20 cm from the plate, where the velocity is 120 cm/sec, calculate the velocity gradients and shear stresses at a distance of 0, 10 and 20cm from the plate, if the viscosity of the fluid is 8.5 poise.

Or

(b) A pipe line which is 4 m in diameter contains a gate valve. The pressure at the centre of the pipe is 19.6 N/cm^2. If the pipe is filled with oil of specific gravity 0.87, find the force exerted by the oil upon the gate and position of centre of pressure.

12. (a) A pipe line carrying oil of specific gravity 0.87, changes in diameter from 200 mm diameter at a position A to 500 mm diameter at a position B which is 4 metres at a higher level. If the pressure at A and B are 9.81 N/cm^2 and 5.886 N/cm^2 respectively and the discharge is 200 litre/s, determine the loss of head and direction of flow.

Or

(b) A horizontal venturimeter with inlet diameter 20 cm and throat diameter 10 cm is used to measure the flow of oil of specific gravity 0.8. The discharge of oil through venturimeter is 60 litres/s. Find the reading of the oil-mercury differential manometer. Take $C_d = 0.98$.

13. (a) A pipe line, 300 mm in diameter and 3200 m long is used to pump up 50 kg per second of an oil whose density is 950 kg/m^3 and whose kinematic viscosity is 2.1 stokes. The centre of the pipe line at the upper end is 40 m above then that at the lower end. The discharge at the upper end is atmospheric. Find the pressure at the lower end and draw the hydraulic gradient and the total energy line.

Or

(b) What is the condition for maximum power transmitted through nozzles ? Derive the expression for diameter of nozzle for maximum transmission of power through nozzle.

14. (a) If the stream function for steady flow is given by $\psi = \left(y^2 - x^2\right)$, determine whether the flow is rotational or irrotational. Then determine the velocity potential ϕ.

Or

(b) A uniform flow with a velocity of 20 m/s is flowing over a source of strength 10 m^2/s. The uniform flow and source flow are in the same plane. Obtain the equation of the dividing stream line and sketch the flow pattern.

15. (a) Oil with a free stream velocity of 2 m/s flows over a thin plate 2 m wide and 2 m long. Calculate the boundary layer thickness and the shear stress at the trailing end point and determine the total surface resistance of the plate. Take specific gravity as 0.86 and kinematic viscosity as 10^{-5} m^2/s.

Or

(b) A man weighing 90 kgf descends to the ground from an aeroplane with the help of a parachute against the resistance of air. The velocity with which the parachute, which is hemispherical in shape, comes down is 20 m/s. Find the diameter of the parachute. Assume $C_D = 0.5$ and density of air = 1.25 kg/m^3.

(5 × 12 = 60 marks)

F 3532

(Pages : 2)

Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2016

Third Semester

Branch : Automobile/Mechanical/Production Engineering

AU 010 304/ME 010 304/PE 010 304—METALLURGY AND MATERIAL SCIENCE
[AU, ME, PE]

[New Scheme—2010 Admission onwards]

(Improvement/Supplementary)

Time : Three Hours

Maximum : 100 Marks

Part A

Answer **all** *questions.*
Each question carries 3 *marks.*

1. Compare ionic and covalent bonds.
2. Explain effect of grain boundary, on creep resistance.
3. State and explain ? Gibbs phase rule with examples.
4. What is SG iron ? Explain its properties.
5. List different mechanism of creep.

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*
Each question carries 5 *marks.*

6. Explain different types of crystal systems.
7. Explain :
   (a) Determination of crystal structure using X-ray diffraction.
   (b) Ficks law of diffusion.
8. Compare between martempering and austempering. Mark the processes in a TTT curve.
9. Explain the effect of alloying of the following elements in steel :
   (i) Nickel.
   (ii) Copper.
10. Draw and explain the ductile brittle transition curve.

(5 × 5 = 25 marks)

Turn over

Part C

Answer **all** *questions.*
Each full question carries 12 *marks.*

11. (a) Determine atomic packing factor for FCC crystal.

(b) Explain polymorphism with 2 examples.

Or

12. Explain the features of metallic bonding. What are secondary bonds ?

13. Explain various stages of crystallisation. Explain the effect of grain size on creep resistance.

Or

14. Explain different types of line and surface imperfections.

15. Explain various reactions with reference to an iron-carbon diagram.

Or

16. Explain the term hardenability. Explain the Jomini-end quench test for determine hardenability.

17. Explain the effect of following elements alloyed with steel :

(i) Tungsten.

(ii) Vanadium.

(iii) Molybdenum

(iv) Copper.

Or

18. Explain the features of the following alloys with examples :

(i) Aluminium alloys.

(ii) Copper alloys.

(iii) Titanium alloys.

(iv) Nickel alloys.

19. Draw and explain a creep curve. Explain, how a creep resistant design can be made ?

Or

20. Explain in detail various factors affecting fatigue strength of a material.

[5 × 12 = 60 marks]

F 3544 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2016

Third Semester

Branch : Automobile Engineering/Mechanical Engineering/Production Engineering/ Metallurgy

AU 010 305/ME 010 305/PE 010 305/MT 010 305—PROGRAMMING IN C
[AU, ME, PE, MT]

(New Scheme—2010 Admission onwards)

[Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Write neat and efficient C programs wherever required.

Part A

Answer **all** *questions.*
Each question carries 3 *marks.*

1. Differentiate local and global variables.
2. How are one dimensional and two dimensional arrays initialized ?
3. What do you meant by call by value method ?
4. Define pointer variables.
5. Give examples and operation of any *three* bitwise logical operator.

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*
Each question carries 5 *marks.*

6. With examples, differentiate while and do-while loops.
7. Explain any *two* string handling functions in C.
8. What is meant by recursion ? Give an example.
9. Write short notes on Array of pointers. Give examples.
10. Explain any *three* file handling operations in C language.

(5 × 5 = 25 marks)

Turn over

Part C

Answer **all** *questions.*
Each full question carries 12 *marks.*

11. Write a C program to find the summation of first n terms of sine series given by :

$$\text{SIN (X)} = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \ldots\ldots\ldots\ldots\ldots\ldots (n \text{ terms}).$$

Or

12. (a) Write short notes on precedence of operators. (6 marks)

(b) Write a C language to check whether the given number is palindrome or not. (6 marks)

13. Write a C program to find the transpose of a given matrix. Print the result matrix in matrix format.

Or

14. Write a C program to find the addition of two given matrix. Print the result matrix in matrix format.

15. What do you mean by user defined functions ? Write a C program to check whether the given number is prime-number or not using functions.

Or

16. Write a C program to sort the values of a given float array, using functions.

17. (a) Write short notes on dynamic memory allocation. (6 marks)

(b) Write a C program to swap the values of two variables using functions. (6 marks)

Or

18. Develop a linked list program to read the following information of employees.

Employee name, date of birth, salary. Display the list of employees with salary in descending order. Also, show how to delete an employee.

19. Write an interactive file handling C program to illustrate the maintaining the record of book details in library. How to process : (i) addition of new record and ; (ii) deletion of an existing record.

Or

20. Write a C program that copies one text file to another and inserts blank lines between paragraphs in the new file. Paragraphs are identified by a new line character.

(5 × 12 = 60 marks)

F 3555 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2016

Third Semester

Branch : Automobile Engineering/Mechanical Engineering/Production Engineering/ Polymer Engineering

AU 010 306/ME 010 306/PE 010 306/PO 010 306—STRENGTH OF MATERIALS AND STRUCTURAL ENGINEERING (AU, ME, PE, PO)

(New Scheme—2010 Admission onwards)

[Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*

Each question carries 3 *marks.*

1. State Hooke's law.
2. Define point of inflection or contraflexure.
3. Define section modulus.
4. Define 'polar modulus'.
5. What are the limitations of Euler's formula ?

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*

Each question carries 5 *marks.*

6. Define the three elastic constants and write the relationship between them.
7. Derive the relationship between shearforce, bending moment and intensity of loading.
8. What are assumptions made in the theory of simple beding ? Derive an expression for bending stress at a layer in a beam.
9. Discuss the analysis of a delta rosette for principal strains.
10. Derive the simple torsion formula for circular shaft.

(5 × 5 = 25 marks)

Turn over

Part C

Answer **all** *questions.*

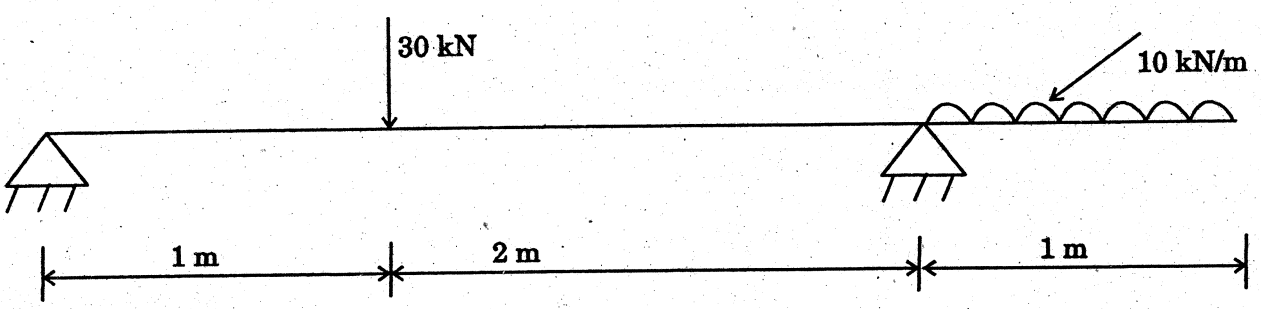
Each question carries 12 *marks.*

11. An aluminum tube of 40 mm. external diameter and 20 mm. internal diameter is fitted onto a solid steel rod of 20 mm. diameter. The composite bar is loaded in compression by an axial load P. Find the stress in aluminium, when the stress in steel is 70 N/mm^2. Also find the value of P. Take E_S = 200 kN/mm^2 and E_{AP} = 70 kN/mm^2.

Or

12. A steel rod 750 mm. long has a cross-sectional area of 1200 mm^2 over 300 mm. of its length and 1800 mm^2 over the remaining 450 mm. At a temperature of 10° C, the rod fits exactly between unyielding walls at its two ends. Compute the maximum compressive stress that will exist at 40° C. $E_S = 2 \times 10^5$ N/mm^2 $\alpha_S = 12 \times 10^{-6}$/°C. What will happen at 0° C ?

13. Draw SFD and BMD for the beam shown below :



Or

14. A simply supported beam is subjected to a u.d.l. of 4 kN/m over the right half and a concentrated load 6 k N at the left hand quarter point on the span of 10 m. Draw SFD and BMD. Find the location and magnitude of maximum bending moment.

15. A simply supported beam of span 6 m. is subjected to a point load of 40 kN at midspan. Calculate : (i) The deflection at one third point ; (ii) Toleflection at one fourth ; and (iii) Slope at supports. Use moment-area method.

Or

16. A simply supported beam has a span of 5 m. and a rectangular cross-section 150 mm. × 300 mm. Find the uniformly distributed load it can carry, if the maximum bending stress and the maximum shear stress are not to exceed 8 N/mm^2 and 0.6 N/mm^2 respectively.

17. A shaft is required to transmit 145 kN power at 240 rpm. The maximum torque may be 1.5 times the mean torque. The shear stress in the shaft should not exceed 60 N/mm^2 and the twist 1° per metre length. Determine the diameter required.

Or

18. A compound cylinder has inner radius 200 mm., radius at common surface 250 mm. and outer radius is 300 mm. Initial pressure at common surface is 10 N/mm^2. What are the hoop stresses after a fluid is admitted at a pressure of 90 N/mm^2. Sketch the variation of hoop and radial stresses.

19. A point in a strained material is subjected a horizontal tensile stress of 100 kN/m^2 and vertical compressive stress of 150 kN/m^2. Determine graphically the normal and tangential stresses acting on a plane inclined at 30° with minor stress plane. Also determine the maximum shearstress.

Or

20. A hollow circular column 2m. long has one end fixed and the other end free. The ratio of diameters is 0.8. Assuming factor of safety of 4, calculate external dia to support a 500 kN load using Rankine's formula. $f_y = 330$ N/mm^2 $\alpha = 1/7500, E = 2 \times 10^5$ N/mm^2. Calculate external diameter using Euler's formula.

(5 × 12 = 60 marks)

F 3566 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2016

Third Semester

Branch : Mechanical and Automobile Engineering

MACHINE DRAWING–I (M, U)

(Old Scheme—Prior to 2010 Admissions)

(Supplementary/Mercy Chance)

Time : Three Hours Maximum : 100 Marks

Missing dimensions, if any, may be assumed.
Drawing sheets will be supplied.
Answer **all** *questions.*

1. Answer any *two* of the following :—

   (a) Sketch and explain any *three* types of locking devices. (15 marks)

   (b) Draw any *three* views of square nut for M30 bolt. Use standard proportions. (15 marks)

   (c) Draw any *three* forms of rivet head. Sketch and explain a butt joint with multiple riveting in chain.

   (15 marks)

   [2 × 15 = 30 marks]

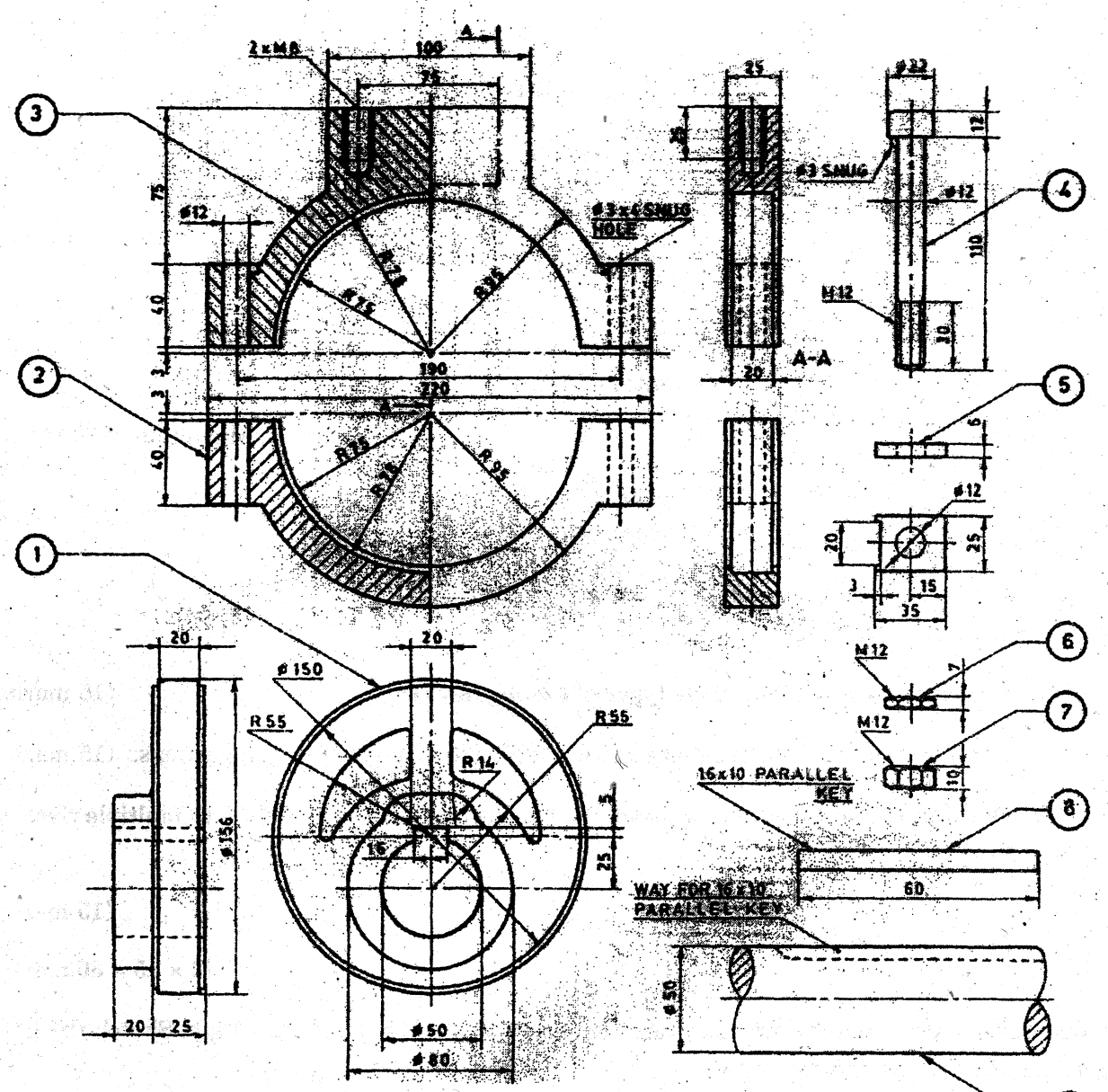
2. Two square rods of side 50 mm each, are connected by a cotter joint with a gib. Sketch the half-sectional front view and side view.

   (25 marks)

3. Details of a simple eccentric are shown in Figure 1 (on page 2). Assemble the parts and draw left half-sectional elevation.

   (45 marks)

Turn over



ITEM LIST

Item	Description	Qty.	Material
1	Sheeve	1	C. S.
2	Strap half (Bottom)	1	C. I.
3	Strap half (Top)	1	C. I.
4	Bolt	2	M. S.
5	Shim	2	Brass
6	Lock nut	2	M. S.
7	Nut	2	M. S.
8	Key	1	M. S.
9	Shaft	1	Steel

Fig. 1

SIMPLE ECCENTRIC

F 3592 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2016

Third Semester

Branch : Mechanical Engineering and Automobile Engineering

THERMODYNAMICS (M, U)

(Old Scheme—Supplementary/Mercy Chance)

[Prior to 2010 Admissions]

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*
Each question carries 4 *marks.*

1. Define compressibility factor.
2. What is thermal equilibrium ?
3. Write a note on work-heat interactions.
4. Discuss the concept of energy.
5. What do you mean by reversible process ?
6. State a Corollary of second law of thermodynamics.
7. Define the specific heats of a system.
8. State the applications of thermodynamic relations.
9. What is a P-T diagram ?
10. Write a note on : variation in thermodynamic properties of mixtures.

(10 × 4 = 40 marks)

Part B

Answer **all** *questions.*
Each question carries 12 *marks.*

11. What is an Ideal gas ? Derive the equation of state for Ideal gas as well as real gas.

Or

12. Explain all the essential components of a thermodynamic system. Discuss the concept of a PVT system.

Turn over

13. A mass of gas is compressed in a quasi-static process from 80 KPa, 0.1 m^3 to 0.4 MPa, 0.03m^3. Assuming that the pressure and volume are related by PV^n = constant, find the work done by the gas system.

Or

14. Explain first law of thermodynamics. Discuss the concepts of first law for a closed system and open system. Discuss the applications.

15. An inventor claims to have developed an engine that takes in 105 MJ at a temperature of 400 K, rejects 42 MJ at a temperature of 200 K, and delivers 15 KWh of mechanical work. Would you advise investing money to put this engine in the market ?

Or

16. Discuss the concept of absolute thermodynamic temperature scale. Define and explain the Fowler-Guggenheim statement of third law of thermodynamics.

17. A pressure vessel has a volume of 1 m^3 and contains air at 1.4 MPa, 175°C. The air is cooled to 25°C by heat transfer to the surroundings at 25°C. Calculate the availability in the initial and final states and irreversibility of this process.

Or

18. Explain all the Maxwell equations. Derive the relations from fundamentals.

19. Explain the properties of gases and gas mixtures. Discuss the mixtures of ideal gases and vapours.

Or

20. Show that in a diffusion process, a gas undergoes a free expansion from the total pressure to the relevant partial pressure.

(5 × 12 = 60 marks)

F 3600 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2016

Third Semester

Branch : Mechanical Engineering/Polymer Engineering/Automobile Engineering

STRENGTH OF MATERIALS AND STRUCTURAL ENGINEERING (M, P, U)

(Prior to 2010 Admissions)

[Supplementary/Mercy Chance]

Time : Three Hours Maximum : 100 Marks

Assume missing data if any, suitably.

Part A

Answer **all** *questions.*
Each question carries 4 *marks.*

1. Define plane stress and plane strain.
2. What is Mohr's circle ?
3. Sketch and explain circular and I-sections.
4. Derive the relationship between shear force and load.
5. List the methods of determining deflection of beams.
6. Write a note on moment - area method.
7. Briefly discuss wire wound pipes.
8. Derive an expression for strain energy of a system.
9. Why is the foundation of a column important ?
10. What are eccentrically loaded columns ?

(10 × 4 = 40 marks)

Part B

Answer **all** *questions.*
Each full question carries 12 *marks.*

11. At a point in a loaded specimen, the principal stresses acting on two mutually perpendicular planes are 90N/mm^2 and 60 N/mm^2, both being compressive. Determine the resultant stress acting on a plane inclined at 60° measured clockwise to the plane on which the larger normal stress is acting.

Or

12. A piece of material is subjected to three perpendicular tensile stresses and the strains in three directions are in the ratio 2 : 3 : 4. If the Poisson's ratio is 0.286, find the ratio of the stresses and their values if the greatest is 100 N/mm^2.

13. A beam of I-section has flanges 20 cm × 1.5 cm and web 50 cm × 1cm making overall depth of beam as 53 cm. Compare the flexure strength with that of an equally strong rectangular beam having width half the depth.The beams are of equal masses and same material.

Or

14. A rolled steel joint 200 mm × 160 mm wide has flanges 22 mm thick and web 12 mm thick. Find the proportion in which the flanges and web resist :

    (i) Bending moment.

    (ii) Shear force.

15. For a cantilever beam of length 'l', and carrying a uniformly distributed load 'w' per unit length, find :

    (a) Maximum deflection.

    (b) Maximum slope.

    (c) Deflection at distance 'x' from the fixed end.

Or

16. A cantilever of length 'l' is subjected to *u.d.l.* of w/unit length over half of its length starting from free end. Find the expression for maximum deflection. 'EI' is the flexural rigidity of beam cross-section. Use :

    (a) Moment area method.

    (b) Macaulay's method.

17. A motor developing 20 kW of power at 300 rev/min is coupled to pump shaft. If the pump shaft is of 5 cm diameter, find the maximum shear stress in the pump shaft (neglecting bending and axial thrust).

Or

18. Explain the stresses developed in a thick cylinder subjected to external pressure. Derive expressions for the same.

19. A hollow alloy steel tube 5 m long with external and internal diameters 40 mm and 25 mm was found to extend 6.4 mm under a tensile load of 60 kN. Find the buckling load for tube when used as column with both ends pinned.

Or

20. Describe the principles of reinforced concrete. Derive relevant equations.

(5 × 12 = 60 marks)

F 3566 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2016

Third Semester

Branch : Mechanical and Automobile Engineering

MACHINE DRAWING–I (M, U)

(Old Scheme—Prior to 2010 Admissions)

(Supplementary/Mercy Chance)

Time : Three Hours Maximum : 100 Marks

Missing dimensions, if any, may be assumed.

Drawing sheets will be supplied.

Answer **all** *questions.*

1. Answer any *two* of the following :—

   (a) Sketch and explain any *three* types of locking devices. (15 marks)

   (b) Draw any *three* views of square nut for M30 bolt. Use standard proportions. (15 marks)

   (c) Draw any *three* forms of rivet head. Sketch and explain a butt joint with multiple riveting in chain. (15 marks)

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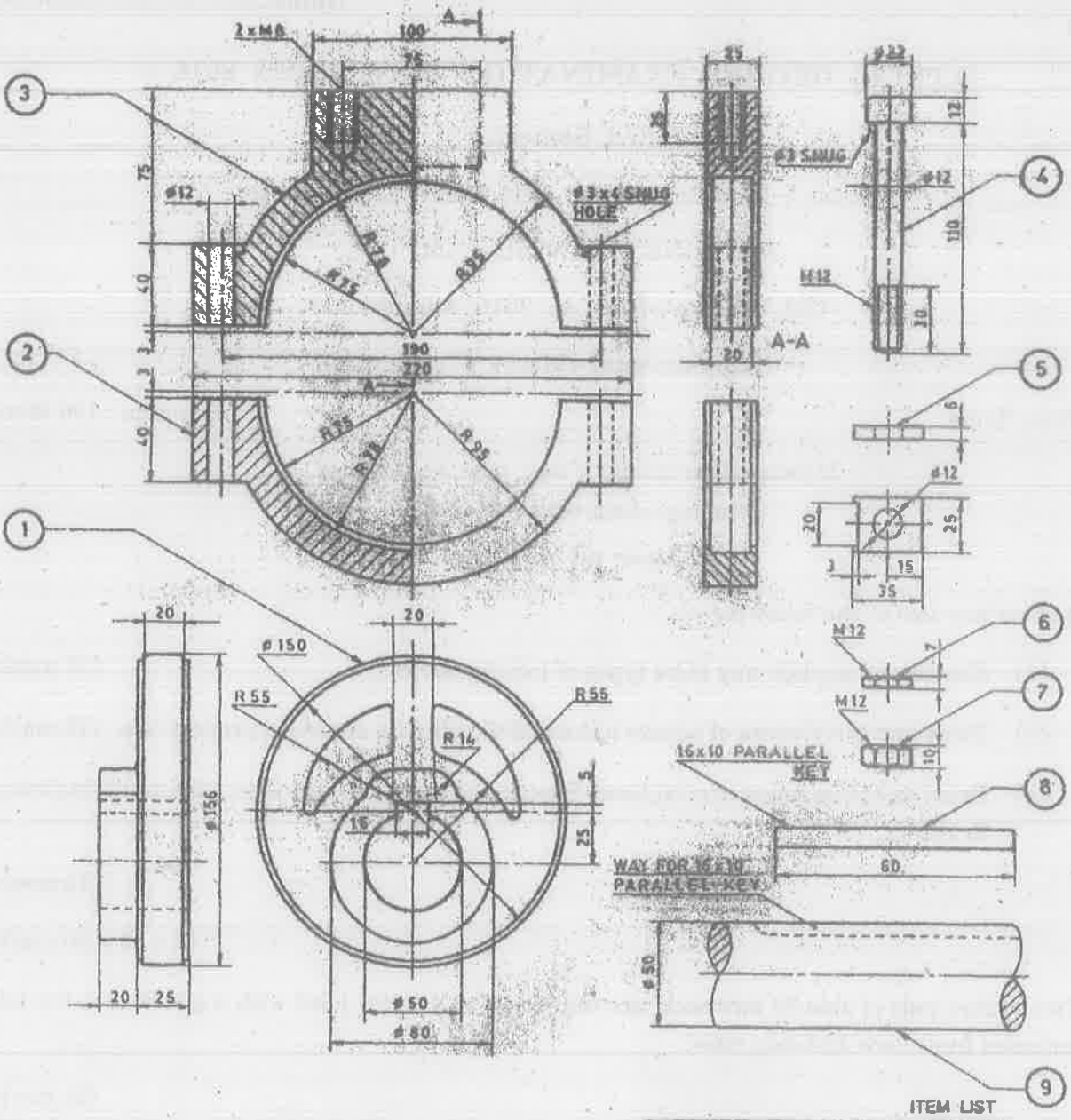
2. Two square rods of side 50 mm each, are connected by a cotter joint with a gib. Sketch the half-sectional front view and side view. (25 marks)

3. Details of a simple eccentric are shown in Figure 1 (on page 2). Assemble the parts and draw left half-sectional elevation. (45 marks)



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4	Bolt	2	M. S.
5	Shim	2	Brass
6	Lock nut	2	M. S.
7	Nut	2	M. S.
8	Key	1	M. S.
9	Shaft	1	Steel

Fig. 1

SIMPLE ECCENTRIC