END SEMESTER EXAMINATION MAY-2023

Course Name: - B.Tech (ME) **Semester: - 2nd**

Paper Name: - Engineering Mechanics **Paper Code: - TES-203**

Time - 3 Hrs + 20 minutes per hour extra time for V.I. & examinees with writer. **Max Marks-70**

समय– 3 घण्टे + 20 मिनट प्रति घंटे अतिरिक्त–दृष्टिबाधित एवं सह लेखक परीक्षार्थियों के लिए। अधिकतम अंक–70

Instructions:
- The question paper consists of three sections namely A, B, C. All sections are compulsory.
- Section A- Each question carries 3 mark. All questions are compulsory.
- Section B- Answer any 5 out of 6 given questions in maximum hundred (150) words. Each question carries 7 marks.
- Section C- Answer any 2 out of 3 given questions in maximum five hundred (500) words. Each question carries 10 marks.

निर्देश:
- प्रश्न पत्र में तीन खण्ड अ, ब, व स हैं। सभी खण्ड अनिवार्य हैं।
- खण्ड–अ में प्रत्येक प्रश्न तीन अंक का है। सभी प्रश्न अनिवार्य हैं।
- खण्ड–ब में छः प्रश्नों में से किन्हीं पाँच प्रश्नों के उत्तर अधिकतम 150 शब्दों में दें। प्रत्येक प्रश्न सात अंक का है।
- खण्ड–स में तीन प्रश्नों में से किन्हीं दो प्रश्नों के उत्तर अधिकतम (300) शब्दों में दें। प्रत्येक प्रश्न 10 अंक का है।

Section – A (खण्ड–अ)

Objective Questions (वस्तुनिष्ठ प्रशन)

1. **Answer all the following questions.** 5×3 =15
निम्नलिखित समी प्रश्न अनिवार्य हैं।

   i) A ball, weighing W is tied to a smooth wall with a single wire. If the string makes angle θ with the wall, reaction from the wall is
      a) $W \tan\theta$
      b) $W \sin\theta$
      c) $W \cos\theta$
      d) $W \cot\theta$

   ii) The Law stating that the algebraic sum of moments of a system of coplanar forces about a moment centre is equal to the moment of their resultant force about the same moment centre is known as
      a) Lami's Theorem
      b) Varignon's theorem
      c) D' Alembert 's principle
      d) Law of transmissibility

   iii) Moment of inertia of a circular section of radius R about its diametral axis is
      a) $\Pi R^4/64$
      b) $\Pi R^4/32$
      c) $\Pi R^4/4$
      d) $\Pi R^4/8$

   iv) If two forces F1 and $F_1/2$ are acting on a body at right angles to each other the resultant will be in the direction _____ to the direction of force F_1.
      a) 30°
      b) Zero
      c) 45°
      d) 60°

v) In a simply supported beam of 5m span a 30 KN -m moment is acting at a dis. of the
support A. In this beam reaction at support A is
   a) 15 KN
   •b) 6 KN
   c) 12 KN
   d) 75 KN

Section – B (खण्ड–ब)
Short Answer Questions (लघुउत्तरीय प्रश्न)

2. Answer any five of the following questions in maximum 150 words.
निम्नलिखित में से किन्हीं पाँच प्रश्नों के उत्तर अधिकतम 150 शब्दों में दें।   5×7=35

i. A beam of 20 m long supported on two intermediate supports , 12m apart carries a UDL of 6KN/ M
and two concentrated loads of 30 KN at left end A and 50 KN at the right end B as shown in Fig.1.
How far away should the first support C be located from the end A so that the reactions at both the
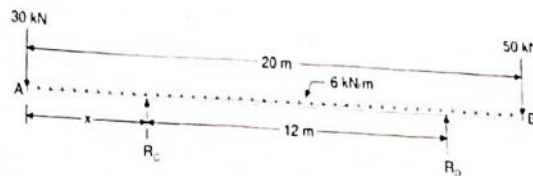supports are equal?

Fig.1

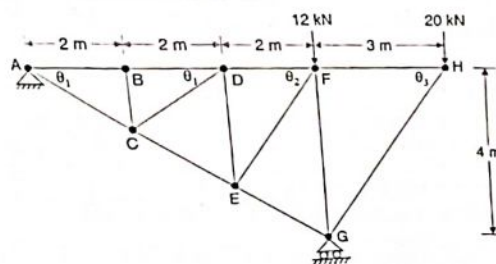ii. Find the forces in all the members of the truss shown in Fig.2.

Fig.2

iii. A block weighing 500 N just starts moving down a rough inclined plane when supported by a force of
200 N acting parallel to the plane in upward direction. The same block is on the verge of moving up
the plane when pulled by a force of 300N acting parallel to the plane .Find the inclination of the plane
and coefficient of the friction between the inclined plane and the block.

Determine the reactions at A, B and D of the Compound beam shown in Fig.3. Neglect the self-weight of the members.
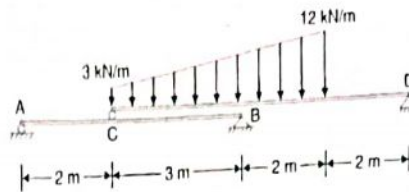

Fig.3

v. Differentiate between center of gravity and centroid. Under what condition these will coincide? State triangle law and polygon law of forces.

vi. State and prove Lami's theorem.

vii. A 400 N sphere is resting in a trough as shown in Fig.4. Determine the reaction developed at the contact surfaces. Assume all contact surfaces are smooth.
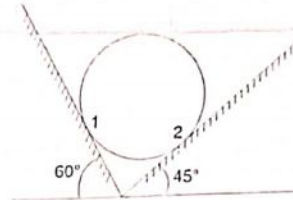

Fig.4

Section – C (खण्ड–स)

Descriptive Questions (विवरणात्मक प्रश्न)

3. Answer any two of the following question in maximum 300 words.   2×10=20
   निम्नलिखित में से किन्हीं दो प्रश्नों के उत्तर अधिकतम 300 शब्दों में दें।

i) (a) A ladder weighing 100 N is to be kept in the position shown in Fig.5 resting on a smooth floor and leaning on a smooth wall. Determine the horizontal force required at floor level to prevent it from slipping when a man weighing 700 N is at 2 m above floor level.

Fig.5

(b) Explain the behaviour of stress-strain curve for the mild steel specimen by describing various points and its practical importance.

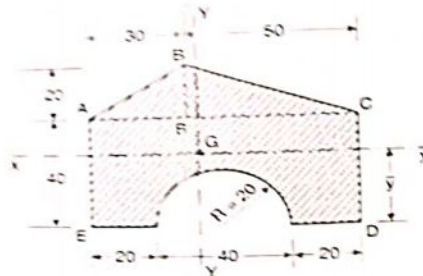ii) (a) Find the second moment of the shaded portion shown in Fig.6 about its centroidal axis.

Fig.6

(b) Explain the type of loads supports and beams with neat sketch.

iii) (a) A circular rod of diameter 16 mm and 500 mm long is subjected to a tensile force 40 KN. The modulus of elasticity for steel may be taken as 200 KN/mm². Find stress, strain and elongation of the bar due to applied load.

(b) The bar shown in Fig.7 is tested in universal testing machine. It is observed that at a load of 40 KN and the total extension of the bar is 0.280 mm. Determine the Young's modulus of the material.
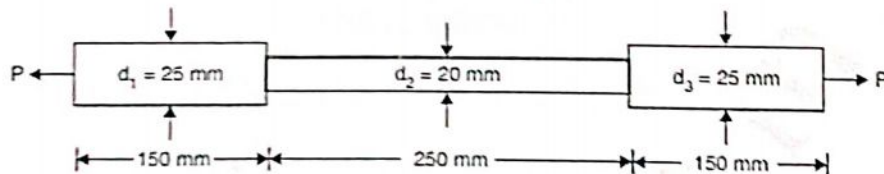

Fig.7

END SEMESTER EXAMINATION DECEMBER-2023

Course Name: - B.Tech (ME)
Semester: - 1st
Paper Name: - Engineering Mechanics
Paper Code: - TES-103
Time - 3 Hrs + 20 minutes per hour extra time for V.I. & examinees with writer.
Max Marks-70
समय– 3 घण्टे + 20 मिनट प्रति घंटे अतिरिक्त–दृष्टिबाधित एवं सह लेखक परीक्षार्थियों के लिए।
अधिकतम अंक–70

Instructions:
- The question paper consists of three sections namely A, B, C. All sections are compulsory.
- Section A- Each question carries 3 mark. All questions are compulsory.
- Section B- Answer any 5 out of 6 given questions in maximum hundred (150) words. Each question carries 7 marks.
- Section C- Answer any 2 out of 3 given questions in maximum five hundred (500) words. Each question carries 10 marks.

निर्देश:
- प्रश्न पत्र में तीन खण्ड अ, ब, व स हैं। सभी खण्ड अनिवार्य हैं।
- खण्ड–अ में प्रत्येक प्रश्न तीन अंक का है। सभी प्रश्न अनिवार्य हैं।
- खण्ड–ब में छः प्रश्नों में से किन्हीं पाँच प्रश्नों के उत्तर अधिकतम 150 शब्दों में दें। प्रत्येक प्रश्न सात अंक का है।
- खण्ड–स में तीन प्रश्नों में से किन्हीं दो प्रश्नों के उत्तर अधिकतम (300) शब्दों में दें। प्रत्येक प्रश्न 10 अंक का है।

Section – A (खण्ड–अ)

Objective Questions (वस्तुनिष्ठ प्रशन)

1. Answer all the following questions.
निम्नलिखित सभी प्रश्न अनिवार्य हैं।
5×3 =15

i) The moment of inertia of a triangle of base width b and height h about is base is
   - a) $bh^3/36$
   - b) $bh^3/12$
   - c) $bh^3/6$
   - d) $bh^3/3$

ii) A ball, weighing W is tied to a smooth wall with a single wire. If the string makes angle θ with the wall , reaction from the wall is
   - a) W $\tan\theta$
   - b) W $\sin\theta$
   - c) W $\cos\theta$
   - d) W $\cot\theta$

iii) If a body is in equilibrium under the action of three forces F1, F2 and F3 and with angles 100°,120° and 140° between F_1 and F_2, F_2 and F_3 , F_3 and F_1 respectively , then according to Lami's theorem
   - a) $F_1/\sin 100° = F_2/\sin120° = F_3/\sin140°$
   - b) $F_1/\sin120° = F_2/\sin140° = F_3/\sin100°$
   - c) $F_1/\cos100° = F_2/\cos120° = F_3/\cos140°$
   - d) $F_1/\cos120° = F_2/\cos140° = F_3/\cos100°$

iv) If F is limiting friction , N is normal reaction and R is resultant of F and N , the angle of limiting friction is
   - a) Angle between F and N
   - b) Angle between F and R
   - c) Angle between N and R
   - d) None of the above

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Course Name:- B.Tech   **Semester:- I**

Paper Name:- Engineering Physics   **Paper Code:- TBS 101**

Time - 2 Hrs + 20 minutes per hour extra time for V.I. & examinees with writer.   Max Marks-70

समय– 2 घण्टे + 20 मिनट प्रति घंटे अतिरिक्त–दृष्टिबाधित एवं सह लेखक परीक्षार्थियों के लिए।   अधिकतम अंक–70

Instructions:
- The question paper consists of three sections namely A, B, C. All sections are compulsory.
- Section A- Each question carries 04 marks. All questions are compulsory.
- Section B- Answer any **2 out of 4** given questions in maximum hundred **(150) words**. Each question carries **10 marks**.
- Section C- Answer any **2 out of 3** given questions in maximum five hundred **(250) words**. Each question carries **15 marks**.

निर्देश:
- प्रश्न पत्र मे तीन खण्ड अ, ब, व स है। सभी खण्ड अनिवार्य है।
- खण्ड–अ मे प्रत्येक प्रश्न **चार** अंक का है। सभी प्रश्न अनिवार्य है।
- खण्ड–ब मे **चार** प्रश्नो मे से किन्ही **दो** प्रश्नो के उत्तर अधिकतम डेढ़ सौ (150) शब्दों में दें। प्रत्येक प्रश्न 10 अंक का है।
- खण्ड–स मे **तीन** प्रश्नो मे से किन्ही **दो** प्रश्नो के उत्तर अधिकतम ढाई सौ (250) शब्दों में दें। प्रत्येक प्रश्न 15 अंक का है।

Section – A (खण्ड–अ)

Objective Questions (वस्तुनिष्ठ प्रश्न)

1. Answer all the following questions.   **5×4=20**
निम्नलिखित सभी प्रश्न अनिवार्य है।

i) According to Einstein's Special Theory of Relativity, laws of physics can be formulated based on
- a) Inertial Frame of Reference ✓
- b) Non-Inertial Frame of Reference
- c) Both Inertial and Non-Inertial Frame of Reference
- d) Quantum State

ii) In the Fresnel's Biprism experiment, the two Coherent sources are obtained by
- a) reflection
- b) internal reflection
- c) refraction
- d) reflection and refraction both ✓

iii) Magnetic field can be produced by _____
- a) Conduction current
- b) Displacement current
- c) Both Current ✓
- d) It is produced naturally

iv) The wave function of free particle is?
- a) plane wave ✓
- b) standing wave
- c) stationary wave ✓
- d) longitudinal wave ✗

v) Which of the following is an example of optical pumping?
- a) Helium-Neon laser ✓
- b) Semiconductor laser
- c) Dye laser
- d) Ruby laser

1

Section – B (खण्ड-ब)
Short Answer Questions (लघुउत्तरीय प्रश्न)

2. Answer any two of the following questions in maximum 150 words.   10×2=20

निम्नलिखित में से किन्ही **दो** प्रश्नों के उत्तर अधिकतम 150 शब्दों में दें।

   i)   (a) Describe the Young's double slit experiment with proper diagram.

         (b) What is Polarization and Polarisation by reflection?

   ii)   (a) Explain the Einstein's mass energy equivalence.

         (b) Describe the Laplace's equation for electrostatic potentials. Also, explain the continuity equation.

   iii)   (a) Write down the differential and integral form of Maxwell's equation.

         (b) Explain the continuity equation and Poynting theorem.

   iv)   (a) Write short note on de-Broglie hypothesis, phase velocity and group velocity.

         (b) Derive the relation between the Einstein's A and B coefficient.

Section – C (खण्ड-स)
Descriptive Questions (विवरणात्मक प्रश्न)

3. Answer any two of the following question in maximum 250 words.   2×15=30

निम्नलिखित में से किन्हीं **दो** प्रश्नों के उत्तर अधिकतम 250 शब्दों में दें।

   i)   (a) Describe the Interference in a wedged-shaped thin film with proper sketch diagram.

         (b) Explain in details the Michelson- Morley experiment with proper diagram.

   ii)   (a) Derive the expressions for the Lorentz space time transformations with proper sketch diagram. What is meant by relativistic time dilation?

         (b) With the help of Maxwell equations, shows that $\vec{K}, \vec{H}, and \vec{E}$ are orthogonal to each other.

   iii)   (a) Deduce the expression for time dependent Schrodinger wave equations. Also, Find the probability that a particle trapped in a box L (100 Å) wide can be found between 0.45 L and 0.55 L for the ground state.

         (b) What are the characteristics of laser light? Explain the working of He-Ne laser with sketch diagram.
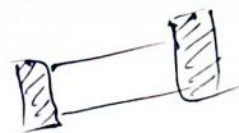
ENDSEMESTER EXAMINATION MAY-2023

Course Name: - B.Tech

Semester:- 2nd

Paper Name: - Environmental Science

Paper Code:- TMC-201

Time - 3 Hrs + 20 minutes per hour extra time for V.I. & examinees with writer.

Max Marks-70

समय–3 घण्टे+ 20 मिनटप्रति घंटेअतिरिक्त–दृष्टिबाधित एवंसहलेखकपरीक्षार्थियों के लिए।

अधिकतम अंक–70

Instructions:

- The question paper consists of three sections namely A, B, C. All sections are compulsory.
- Section A- Each question carries 3 mark. All questions are compulsory.
- Section B- Answer any 5 out of 6 given questions in maximum hundred (150) words. Each question carries 7 marks.
- SectionC- Answer any 2 out of 3 given questions in maximum five hundred (500) words. Each question carries 10 marks.

निर्देश:

- प्रश्न पत्र में तीन खण्ड अ, ब, च स है। सभी खण्ड अनिवार्य है।
- खण्ड–अ में प्रत्येक प्रश्न तीन अंक का है। सभी प्रश्न अनिवार्य है।
- खण्ड–ब में छः प्रश्नों में से किन्ही पाँच प्रश्नों के उत्तर अधिकतम 150 शब्दों में दें। प्रत्येक प्रश्न सात अंक का है।
- खण्ड–स में तीन प्रश्नों में से किन्ही दो प्रश्नों के उत्तर अधिकतम (300) शब्दों में दें। प्रत्येक प्रश्न 10 अंक का है।

Section – A (खण्ड–अ)

Objective Questions(वस्तुनिष्ठप्रश्न)

1. Answer allthe following questions.
निम्नलिखित सभी प्रश्न अनिवार्य हैं।

$5 \times 3 = 15$

i) Which of the following is NOT a greenhouse gas?
   a) Carbon dioxide
   b) Methane
   c) Sulphur dioxide
   d) Nitrous Oxide

ii) The 'Air Act' came into force on
   a) 1986
   b) 1974
   c) 1980
   d) 1981

iii) What happens when phosphorus, nitrates, and detergents in water lead to an acceleration in the growth of algae?
   a) Extinction
   b) Eutrophication
   c) Increase in the number of fishes
   d) Increase in the number of aquatic plants

iv) Which process of water treatment is done to avoid floating debris, branches, trees, or other large particles suspended in water?
   a) Screening
   b) Aeration
   c) Primary sedimentation
   d) Secondary sedimentation

v) The Soil pollutants that affect the food chain and food web by killing microorganisms and plants are
   a) Pathogens
   b) Chemical fertilizers
   c) Agricultural waste
   d) Pesticides

Section – B (खण्ड–ब)
Short Answer Questions (लघुउत्तरीय प्रश्न)

5×7=35

2. Answer any five of the following questions in maximum 150 words.
निम्नलिखित में से किन्हीं पाँच प्रश्नों के उत्तर अधिकतम 150 शब्दों में दें।

i. What are the different types of Natural Resources and why they are necessary to conserve?

ii. Ozone is a life savior, if present in stratosphere; but is a pollutant, if present in troposphere. Justify.

iii. Briefly tell us about 'The Wildlife Protection Act'.

iv. What is Ecosystem? Differentiate between the Terrestrial and Aquatic ecosystem.

v. Illustrate the concept behind the Biodiversity conservation plan 'Project Elephant'.

vi. What do you know about the Chipko and Appiko movement?

vii. What are the causes, impact and control method for the Water pollution?

viii. Write a short notes on:

    a) Sustainable Development

    b) Biomagnification

Section – C (खण्ड–स)
Descriptive Questions (विवरणात्मकप्रश्न)

2×10=20

3. Answer any two of the following question in maximum 300 words.
निम्नलिखित में से किन्हीं दो प्रश्नों के उत्तर अधिकतम 300 शब्दों में दें।

i) What do you understand by Green Chemistry? Describe the goals of Green Chemistry.

ii) What is Biodiversity? Explain the method used for the Conservation of Biodiversity.

iii) Briefly explain the effect of Climate change and Global warming onto the environment.