



# NATIONAL INSTITUTE OF TECHNOLOGY PATNA

## Department of Mechanical Engineering End Semester Examination, July-December 2024

Exam Session: AN

B. Tech: Semester-I

Course Name: Workshop Practice-I

Course Code: ME12102/11102

Maximum Time: 03 Hours, Date: 02<sup>nd</sup> Dec. 2024

Max. Marks: 60

### Instructions:

- Attempts any Five Questions.
- The Marks, CO (Course Outcome) and BL (Bloom's Level) related to question are mentioned on the right hand side margin.

		Marks	CO	BL
1(a).	What are the primary measuring tools used in carpentry shop, and what are their uses?	10	3	2
1(b).	How does moisture content affect wood?	4	2	2
2(a).	What are the primary marking tools used in carpentry shop, and what are their applications?	10	3	1
2(b).	What is the purpose of a marking gauge?	4	3	1
3(a).	Explain the different types of saw in cutting tools with suitable figure.	7	2	2
3(b).	Explain pipe vice with suitable figure.	7	3	2
4(a).	Why clamping devices are necessary and explain different types of vices?	8	2	2
4(b).	Why seasoning of timber is necessary?	6	2	2
5(a).	Explain the differences between a hammer and mallet.	7	3	1
5(b).	Explain dividers and callipers with suitable figure.	7	2	2
6(a).	Explain different types of files with suitable figure.	7	2	2
6(b).	Explain gas welding and flame with suitable figure.	7	3	2

\*\*\*\*\* Best Wishes \*\*\*\*\*



**NATIONAL INSTITUTE OF TECHNOLOGY, PATNA**

**END SEMESTER EXAMINATION: December 2024**

Program: B.Tech./B.Tech.+M.Tech (ME) and /Mechatronics      Department: Physics  
 Course Code: PH12101/PH11101      Course Name: Engineering Physics  
 Full Marks: 60      Duration of Examination: 3 Hours

**Answer All Questions: (Symbols have their usual meanings)**

✓	Q.1	What physical significance of Poynting Vector? The intensity of sun light falling on the earth's surface is $(2 \text{ Cal}) / (\text{min cm}^2)$ . Calculate the magnitude of average electric field intensity (E) and magnetic field intensity (H) on the earth's surface. [10]	
	Q.2	(a) Establish a relation between three electric vectors, E, D, and P. [5]	
		(b) A hydrogen atom (Bohr radius = 0.53 Angstrom) is situated between two metal plates, 1 mm apart, which are connected to opposite terminals of 500 Volt battery. What fraction of the atomic radius does the separation distance "d" amount to roughly. The atomic polarizability ( $\alpha$ ) for hydrogen atom, can be taken from the expression $\frac{\alpha}{4\pi\epsilon_0} = 0.667 * 10^{-30} \text{ m}^3$ . [5]	
✓	Q.3	Derive an expression for the Compton shift in wavelength for a photon scattered from an electron at an angle $\theta$ . [10]	
✓	Q.4	Show that nature of electromagnetic wave is transverse. The electric field vector $\vec{E}$ of a plane electromagnetic wave in a medium ( $\epsilon_r = 4$ , $\mu_r = 1$ ) is given in SI units as $\vec{E} = 20 \sin(10^7 t - kx) \hat{j}$ . Find the value of k and magnetic field vector $\vec{B}$ . [10]	
✓	Q.5	Explain the construction, working principle of Ruby Laser with suitable energy level diagram and schematics. [10]	
✓	Q.6	Check the Stokes' theorem using the function $\vec{v} = ay\hat{i} + bx\hat{j}$ (a and b are constants) and the circular path of radius R, centered at the origin in the xy plane. [10]	





राष्ट्रीय प्रौद्योगिकी संस्थान पटना / NATIONAL INSTITUTE OF TECHNOLOGY PATNA  
शिक्षा मंत्रालय, भारत सरकार के अधीन एक राष्ट्रीय महत्व का संस्थान / An Institute of National Importance under Ministry of Education, Govt. of India  
आशोक राजपथ, पटना - 800005, बिहार / ASHOK RAJPATH, PATNA - 800005, BIHAR

DEPARTMENT OF MECHANICAL ENGINEERING

END-SEMESTER EXAMINATION, JULY-DEC 2024

B. Tech: ME  
Course Name: Engineering Graphics  
Maximum Time: 03:00 hours

Semester: 1<sup>st</sup>  
Course Code: ME12101  
Max. Marks: 60

**Note: Attempt All Questions; Assume any suitable data, if necessary**

**Marks**

**Q1.** Draw the projection of the following points on a common reference line, keeping the distance between their projectors 20 mm apart: 12

- a) Point A is in the H.P. and 30 mm behind the V.P.
- b) Point B is 40 mm above the H.P. and 35 mm behind the V.P.
- c) Point C is 50 mm below the H.P. and 20 mm behind the V.P.
- d) Point D is in the V.P. and 40 mm below the H.P.

**Q2.** A hexagonal prism having a base with a 30 mm side and 75 mm long axis has an edge of its base on H.P. Its axis is parallel to the V.P. and inclined at 45° to the H.P. Draw its projections. 12

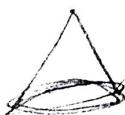
**Q3.** A circular plane with a 60 mm diameter is resting on a point of its circumference on the V.P. The centre is 40 mm above the H.P., and the surface is inclined at 45° to the V.P., and perpendicular to the H.P. draw its projections. 12

**Q4.** A 70 mm long line PQ, has an end P at 20 mm above the H.P. and 30 mm in front of V.P. The line is inclined at 45° to the H.P. and 30° to the V.P. draw its projections. 12

**Q5.** Draw the development of the lateral surface of the cone with a 50 mm base diameter and a 70 mm long axis. The cone is resting on H.P. on its base. 12

**or**

A triangular prism having a base with a 50 mm side and an 80 mm long axis, is laying on its rectangular faces in the H.P. with its axis perpendicular to the H.P. It is cut by a section plane parallel to 20 mm above the H.P. Draw its front view and section top view. 12



\*\*\* Best Wishes \*\*\*



Time: 3 hr.

- Time: 3 hr.

  - Answer any FIVE questions. Assume suitable data if necessary
  - The Marks, CO(Course outcome) and BL(Bloom's Level) related to questions are mentioned.

1. (a) Define Lami's theorem. (b) Determine the stretch in each spring for the equilibrium of the weight  $W=50$  N block as shown in Fig. 1. The springs are in an equilibrium position. The stiffness of each spring is as given as:  $k_1=30$  N/m,  $k_2=40$  N/m, and  $k_3=50$  N/m. (c) Find out the relation of the coefficient of static friction ( $\mu_s$ ) and the maximum angle of inclination ( $\theta_{\max}$ ) of the plane with the horizontal where a blocks of mass  $m$  are placed on the inclined plane and begin to slip. CO1/2 BL2/3/2 3+5+4

2. (a) The 30 N force  $P$  is applied perpendicular to the portion BC of the bent bar as shown in Fig. 2a. Determine the moment of the  $P$  about point B and about point A. (b) Determine the range of value which the mass  $m_0$  may have so that the 100 kg block shown in the Fig. 2b, will neither start moving up the plane nor slip down the plane. The coefficient of static friction for the contact surface is 0.2. CO2/1 BL3/2/2 6+6

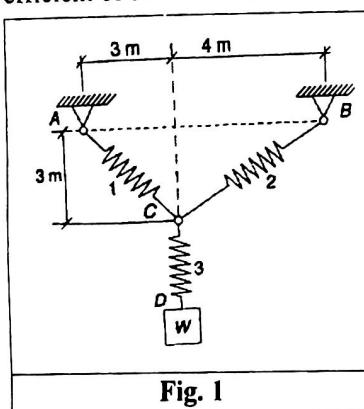


Fig. 1

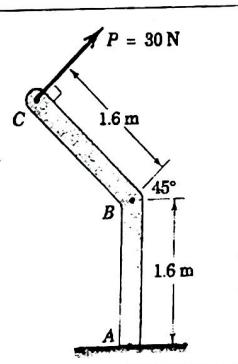


Fig. 2a

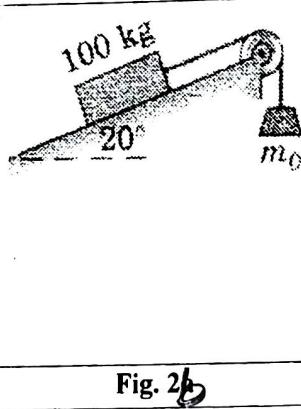


Fig. 2b

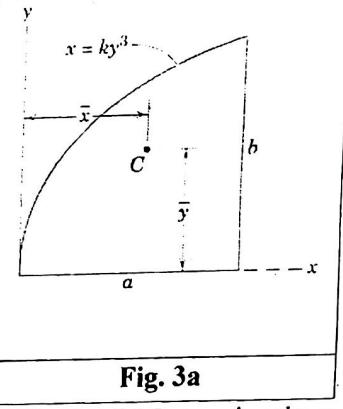
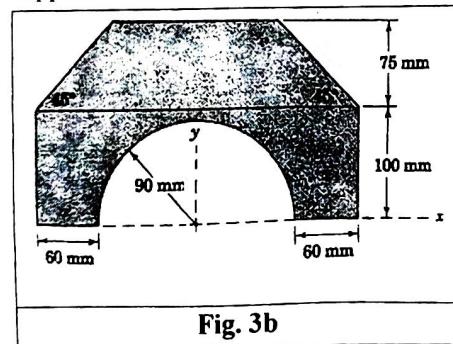


Fig. 3a

- ✓ 3. (a) Locate the centroid of the area under the curve  $x=k^3$  from  $x=0$  to  $x=a$  as shown in Fig. 3a. (b) Determine the y co-ordinate of the centroid of the shaded area as shown in Fig. 3b. CO3 BL3 5+7

✓ 4. (a) Compute the force in each member of the loaded cantilever truss by the method of joints as shown in Fig. 4a. (b) Calculate the force in member DJ of the roof truss illustrated. Neglect the horizontal components of the force at the support as shown in Fig. 4b. CO3 BL3/2 6+6



**Fig. 3b**

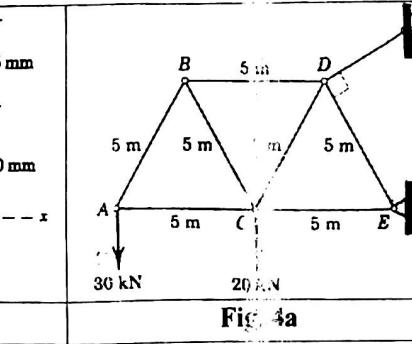


Fig. 4a

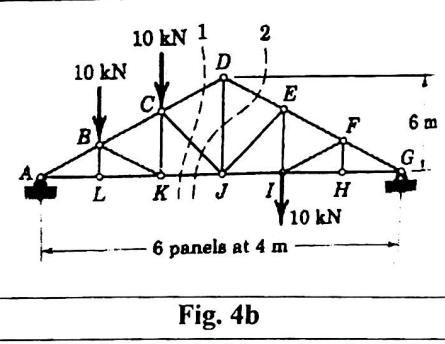


Fig. 4B

- ✓ 5. (a) Determine the shear force and bending moment distributions produced in the simple beam by the 4 k-N concentrated load as shown in Fig. 5a. (b) Determine the shear force and bending moment for the uniformly loaded beam and find the maximum bending moment  $M_{max}$  as shown in Fig. 5b, where  $w=2\text{N/m}$  and  $l=5\text{m}$ . CO4 BL3 5+7  
 $\Sigma_2$  6. (a) Determine the force  $P$  on the sliding collar as shown in Fig 6 which will prevent OA from rotating under the action of the couple  $M$  by method of principle of virtual work. Neglect the mass of the moving parts. (b) Find out the relation of mechanical efficiency of a block being moved up the inclined plane in consideration of principle of virtual work. CO4 BL3 8+1

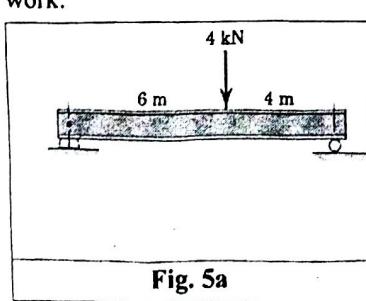


Fig. 5a

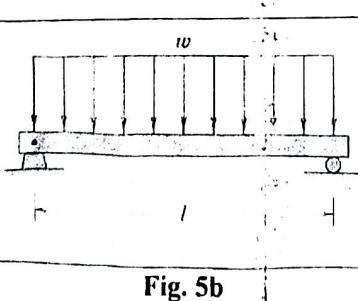


Fig. 5b

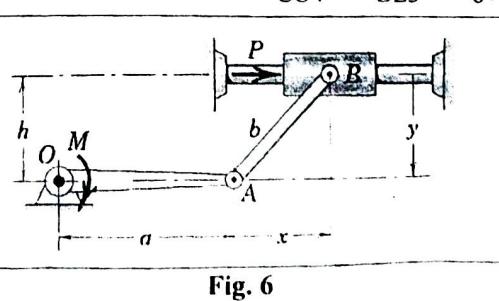


Fig. 6

Course Code: HS12101 & HS16101

Branch: ME- A & EE -A

Course Name: Communicative English

Full Marks: 45

Duration of Examination: 3 hours

**Note: Answer all the questions in your own words. Each Question Carries 5 Marks.**

- ✓ 1. Kinesics, Paralinguistic, Proxemics, Chronemics, Haptics, Gaze, Intimate Space, Psychological Responses, Personal Appearance, Physical Environment, etc. are the main features of non - verbal communication. Explain these in 300 words.
- ✗ 2. Discuss the features of an effective email. Highlights writing techniques required to draft effective professional emails. Provide appropriate examples to substantiate your answer
- ✗ 3. Define a Report. Discuss the Purpose and types of reports.
- ✓ 4. Explain the Art of Condensation by presenting appropriate format and examples.
- ✓ 5. Discuss G. D . Debate, Conference, Seminar, Conversation and Dialogues.
- ✗ 6. Suggest some steps to remove the accent barriers between Native Speakers and Second Learners.
- ✗ 7. As Ashutosh Rana, the Public Relations Officer of Vipro India Ltd. You have been asked to draft a memo to the office and staff about the company's annual conference. Include the given information in the memo.  
(a) Venue of the Conference  
(b) Date and Time  
(c) Theme
- ✓ 8. Write a letter applying for the mentioned job in response to the following advertisement.  
We are a reputed IT Company looking for Software Professionals for our Development Centre at Bangalore. As a Software Engineer you must have two to four year experience in IT Organizations. Engineering Graduates with extensive exposure to design development and testing will be preferred.
- ✓ 9. Your placements are going to commence next month. What preparations will you make to get through the interview? Also write short notes on the following topics.  
(a) Your Strengths & Weaknesses  
(b) Your Long Term and Short Term Goals



Time: 2:00 pm - 5:00 pm

**Note: Attempt any 4 questions from Part A and 4 Questions from Part B. All Question Carry Equal Marks.**

### Part - A

- Q.1. What are the main parts of the lathe Machine?
- Q.2. Explain and draw a neat sketch of the Carriage with the details of its parts.
- Q.3. Explain the classification of Lathe Machines.
- Q.4. How the specification of the lathe machine is decided?
- Q.5. What is cutting tool? Explain the cutting tool Signature with neat sketch.
- Q.6. Explain chip formation in metal machining.

2x 30' 15'  
2x 60' (

### Part - B

- Q.7. Explain Radial drilling machine with its Main Parts by neat sketch.
- Q.8. What are the different types of drilling machine operations? Explain with neat sketches.
- Q.9. How are the drilling machines specified? Explain.
- Q.10. Explain the Cutter holding devices used in milling machine by neat sketches.
- Q.11. What are the different types of milling machine operations? Explain with neat sketches.
- Q.12. What is simple indexing? Explain the process of gear cutting process for cutting 23 teeth using simple indexing method (Plate No. 1:- 15, 16, 17, 18, 19, 20).