Roll No

National Institute of Technology Patna

Mid Semester Examinations, Sept-2024

Course Name: Workshop Practice **Full Marks – 30**

Course Code: ME13102 **Total Time: 2.00 Hours**

Instructions: (i) Answer any Five
(ii) All questions carry equal marks

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1. Describe in brief the procedure of Steel making.

2. Highlight the difference between Cast Iron and Plain Carbon Steel w.r.t. their composition, physical and mechanical properties.

3. Provide a detailed classification about the various types of steel.

4. What are polymers? Describe in brief about the various types of polymers along with a brief write-up about their physical and mechanical properties.

5. List and explain in brief about the commonly used Ceramics.

6. List the advantages of Composites vis-à-vis Metal Alloys. Also provide a write-up about the types of Composites.

NATIONAL INSTITUTE OF TECHNOLOGY PATNA
MID SEMESTER EXAMINATION, September 2024

Program: B. Tech (CE & DD) **Semester:** 1 **Department:** Physics
Course Code: PH13101 **Course Name:** Engineering Physics
Full Marks: 30 **Duration of Examination:** 2 hours

Answer all questions. Please assume missing data suitably, if any.

1. (a) The temperature at a point (x, y, z) in space is given by $T(x, y, z) = x^2 + y^2 - z$. A mosquito located at (1,1,2) desires to fly in such a direction that it gets cooled faster. Which direction it should fly? **[15]**

(b) The potential in a medium is given by $\varphi(r) = \ln|\vec{r}|$, find
(i) the corresponding electric field.
(ii) if the field is irrotational.

(c) Explain why magnetic monopole does not exists? Which of the following vectors can be a magnetic field B? If so, what is the current density J?
(i) $\boldsymbol{B} = a\,\bar{r}$
(ii) $\boldsymbol{B} = a(x\hat{\imath} - y\hat{\jmath})$
(iii) $\boldsymbol{B} = a(x\hat{\jmath} - y\hat{\imath})$

(d) Derive the equation of continuity. How the Ampere's law gets modified in its generalized form?

2. (a) Establish the relationship between displacement vector (**D**) and electric vector (**E**) fields. Find the volume charge density associated with a field given by $\mathbf{D} = xy^2\,\boldsymbol{i} + yx^2\,\boldsymbol{j} + z\,\boldsymbol{k}$ C/m^2. **[15]**

(b) A dielectric medium is placed in vacuum in a uniform electric field of $E = 4\,V/m$. What would be the electric field inside the material if the relative permittivity of the medium is 2?

(c) Differentiate between conduction current and displacement current. In a dielectric material, $E_x = 5$ V/m and $P = 7\pi\,(3\,\mathbf{i} + 5\,\mathbf{j} + 10\,\mathbf{k})$ nC/m^2. Calculate χ_e, **D**, and **E**.

NATIONAL INSTITUTE OF TECHNOLOGY PATNA
MID SEMESTER EXAMINATION, JULY-DEC 2024

Program: B.Tech CE & DD/MCA-DS/M&T/M&C **Semester:** 1st
Course Code: Communicative English **Course Name:** HS13101/ HS17101/HS18101/MCA460104
Branch: B.Tech CE & DD/MCA-DS/M&T/M&C
Full Marks: 22.5 **Duration of Examination:** 2 Hours

Instructions: Answer all the questions in your own words. Faculty-Dr. Zeeshan Ali

1. Analyse the various barriers to communication within organisational settings. How do they affect decision-making and leadership? Evaluate which barriers are most damaging and propose solutions to overcome them. (7.5 marks) CO1

2. Evaluate how effective and poor listening affect leadership, team collaboration, and organisational success. In a scenario where a leader is a poor listener, what are the long-term impacts on team morale, project results, and innovation? Suggest strategies to foster active listening in an organisation. (7.5 marks) CO4

3. Prepare a précis of the passage given below. (7.5 marks) CO7

The world is experiencing rapid urbanisation, with more than half of the global population now living in cities. This trend is expected to continue, with urban areas projected to house 68% of the world's population by 2050. While urbanisation brings economic opportunities, innovation, and improved living standards for many, it also presents significant challenges, particularly in terms of infrastructure, sustainability, and quality of life.

One of the most pressing issues associated with rapid urbanisation is the strain on infrastructure. Cities often struggle to provide adequate housing, transportation, sanitation, and energy services for their growing populations. This results in overcrowding, traffic congestion, pollution, and inadequate access to basic services like clean water and healthcare. In many developing countries, the growth of informal settlements, or slums, further exacerbates these challenges, as governments are often unable to keep pace with the demands of urban growth.

Sustainability is another critical concern. Urban areas are major contributors to climate change, producing over 70% of global carbon dioxide emissions. As cities expand, they consume vast amounts of resources and generate significant waste. Managing this environmental impact requires innovative solutions, such as the adoption of renewable energy sources, efficient public transportation systems, and sustainable urban planning practices that reduce energy consumption and waste.

Quality of life in cities is also at risk. While urban areas offer better access to jobs and services, they can also lead to social isolation, inequality, and health issues. The fast pace of urban life, coupled with pollution and limited green spaces, can negatively affect mental and physical health. Moreover, the gap between rich and poor is often more pronounced in urban settings, leading to increased social tensions.

To address these challenges, governments, urban planners, and citizens must collaborate on creating more inclusive, resilient, and sustainable cities. Smart cities, which use technology to improve efficiency and quality of life, represent a promising solution to many urban challenges. However, achieving sustainable urbanisation requires not only technological innovation but also political will and community engagement.

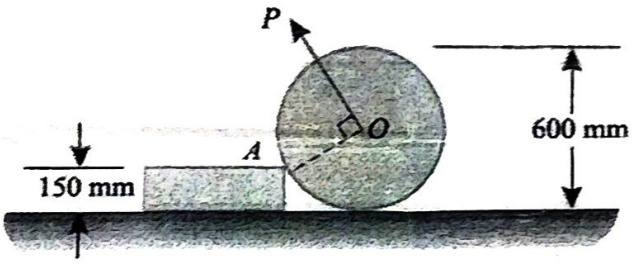
NATIONAL INSTITUTE OF TECHNOLOGY PATNA
Department of Civil Engineering
Mid-Semester Examination, September-2024

Course Name: Engineering Mechanics
Course Code: CE13103
Durations: 2 hours (2:00 - 4:00 PM)

B. Tech: 1st Semester (Gr-B)
DOE: 27/09/2024 (AN)
Full Marks: 30

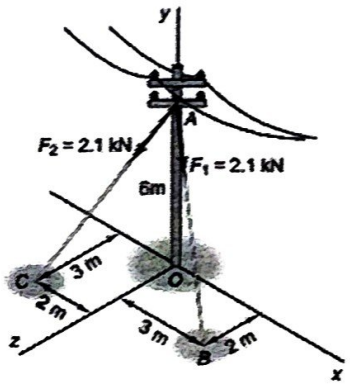
Note: *Answer all the questions serially and as per instructions. Mark for each question is provided on the right-side margin.*

S.N.	Questions	Marks	CO	BL
1	(a) Define: (i) Resultant of force system, (ii) Equivalent force, (iii) Particle	3	1	I
	(b). List out broad classifications of Engineering Mechanics and define each classification accordingly.	6		
2	Explain any six different types of force system with a neat sketch.	6	1	II
3	(a). State and explain Varignon's Principle of Moments.	8	1	III
	(b). A uniform wheel of 600 mm diameter, weighing 5 kN rests against a rigid rectangular block of 150 mm height as shown in Fig. below. Find the least pull, through the centre of the wheel, required just to turn the wheel over the corner A of the block. Also find the reaction on the block. Take all the surfaces to be smooth.			



Or

Two wires are connected to a telephone pole to help support it. Each wire exerts a force of 2.1 kN with a line of action along the wire. Compute the moment about *O* caused by these two forces.



4	**State true (T) or False (F) of the following**: (i). Force is considered both exerted by one body on another. (ii). Size cannot be neglected for particle. (iii). Newton's law apply to the motion of the particle as measured from accelerating reference frame. (iv). If a force is applied at an angle other than 90°, then it will be difficult to turn the bolt. (v). A couple moment is produced by two collinear forces. (vi). Statics is a special case of dynamics, in which the acceleration is infinite. (vii). The direction of moment is defined by its moment axis, which is parallel to the plane that contains the force F and its moment arm d.	7	1	1