

Code: 5G521

I B.Tech. II Semester Regular &amp; Supplementary Examinations June 2017

**Engg Mechanics -Dynamics**

( Common to CE &amp; ME )

Max. Marks: 70

Time: 3 Hours

Answer *all five* units by choosing one question from each unit ( 5 x 14 = 70 Marks )

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**UNIT-I**

1. A particle moves on a vertical line with an acceleration  $a = 2\sqrt{v}$  when  $t = 2$  s, its displacement  $S = \frac{24}{3} \text{ m}$  and its velocity  $V = 16 \text{ m/s}$ . Determine displacement, velocity and acceleration of the particle when  $t = 3$  s. 14M

**OR**

2. A train is travelling from A to D along the track; its initial velocity at A is zero. The train takes 5 min to cover a distance AB, 2250 m length and 2.5 min to cover the distance BC, 3000 m length. On reaching the station C, the brakes are applied and the train stops 2250 m beyond C, at D. Find,
- The retardation on CD
  - The time it takes to cover A to D
  - The average speed for the whole distance
- 14M

**UNIT-II**

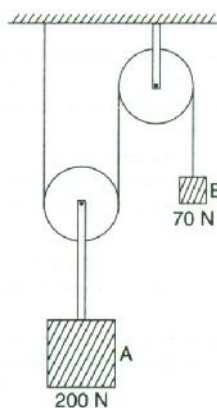
3. A flywheel is rotating at 200 rpm and after 10 seconds it is rotating at 160 rpm. If the retardation is uniform, determine number of revolution made by the flywheel and the time taken by the flywheel before it comes to rest from the speed of 200 rpm. 14M

**OR**

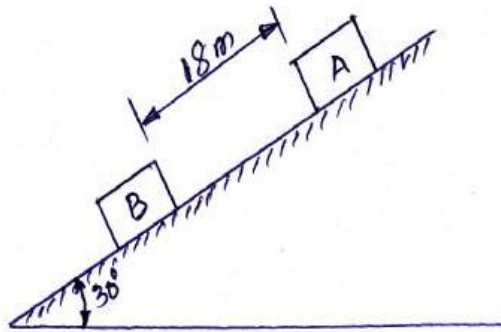
4. The initial angular velocity of a rotating body is 2 rad/s and initial angular acceleration is zero. The rotation of the body is according to the relation,  $\theta = 3t^2 - 3$ . Determine,
- Angular velocity
  - Angular displacement when  $t = 5$  seconds
- Consider the angular displacement in radiation and time in second. 14M

**UNIT-III**

5. Determine the tensions in the strings and accelerations of blocks A and B weighing 200 N and 70 N connected by a string and a frictionless and weightless pulley as shown in figure. 14M

**OR**

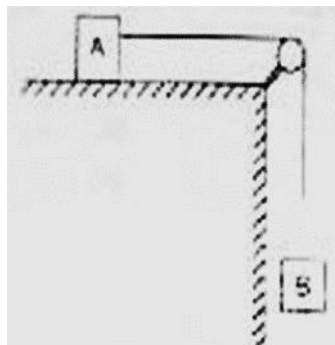
6. Two blocks A and B released from rest on a  $30^\circ$  inclined plate when they are in 18m apart. The co-efficient of friction under the upper block A is 0.2 and lower block is 0.4. In what time, block A reaches block B? After they touch and move as a single unit, what will be the contact force between them? Weights of block A and B are 100 N and 80N respectively.



14M

**UNIT-IV**

7. Two blocks A and B of masses  $m_A = 280$  kg and  $m_B = 420$  kg are joined by an inextensible cable as shown in figure. Assume that pulley is frictionless and  $\mu = 0.3$  between block A and the surface. If the system is initially at rest, determine the velocity of the blocks after it has moved 3.5 m. Use work energy principle.



14M

**OR**

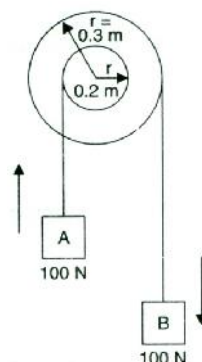
8. A car of weight 9810 N accelerates from rest to a speed of 45 km/hr in a distance of 50 m against a resistance of 100 N. Find the average driving force acting on the car. Using the average force, find the greatest power developed by engine.

14M

**UNIT-V**

9. Two weights each of 100 N are suspended from a compound pulley as shown in figure. Determine
- (i) Angular acceleration of pulley
  - (ii) Linear acceleration of the blocks A and B
  - (iii) Tension of the string.

Take weight of the pulley as 300 N and its radius of gyration 0.25 m



14M

**OR**

10. A homogeneous cylinder of weight 500 N and radius 150 mm is pulled by a horizontal force 200 N through its mass center. Assuming that the cylinder rolls without slipping, determine the angular acceleration of the cylinder. Take the co-efficient of friction of the contact surface as 0.25. Also calculate the distance moved by the cylinder in 2 seconds.

14M

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**R-15**

**Code: 5G121**

*I B.Tech. II Semester Regular & Supplementary Examinations June 2017*

## **C Programming and Data Structures**

(Common to All Branches)

Max. Marks: 70

Time: 3 Hours

Answer all five units by choosing one question from each unit ( 5 x 14 = 70 Marks )

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### **UNIT-I**

1. a) How to access a variable through its pointer? Explain with proper example. 7M
- b) What is Void pointer? Write a 'C' program to demonstrate the use of Void pointer. 7M

**OR**

2. a) What is Dynamic Memory Allocation? Explain the functions malloc(), calloc() and free() with syntax and examples. 7M
- b) Write a 'C' program to implement pointer to pointer concept. 7M

### **UNIT-II**

3. a) Define Union. Explain its general syntax with one example. 7M
- b) Write a 'C' program to display the Name, Rollnumber and Grade of 3 students. Create an array of structure objects. Read and display the contents of the array. 7M

**OR**

4. a) Write detailed notes on formatted input and output functions of files. 7M
- b) Write a 'C' program to implement Binary search technique. 7M

### **UNIT-III**

5. a) How to represent a stack using Arrays and Linked list? Explain with proper diagrams. 7M
- b) Write a 'C' program to implement the stack operations using arrays. 7M

**OR**

6. a) How to convert an Infix expression into a Postfix expression, explain. Convert the following infix expression into postfix expression  
$$(X*Y)/(K*L)+M$$
 7M
- b) Discuss in detail the various operations possible on a Queue. 7M

### **UNIT-IV**

7. a) Write short notes on
  - i) Static representation of Single Linked List.
  - ii) Dynamic representation of Single Linked List. 7M
- b) How to insert a node at the beginning, middle and at the end of a single linked list? Explain with proper diagrams. 7M

**OR**

8. Write detailed notes on all operations on a Doubly Linked List. 14M

### **UNIT-V**

9. a) How to represent a Binary tree using array and linked list? Explain with proper diagrams. 4M
- b) How to do searching operation on a Binary search tree? Write and explain the algorithm for it. 10M

**OR**

10. Write detailed notes on the following representation of a graph
  - i) Set representation
  - ii) Linked List representation
  - iii) Matrix representation 14M

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**Code: 5GC24***I B.Tech. II Semester Regular & Supplementary Examinations June 2017***Engineering Mathematics-II**

(Common to All Branches)

Max. Marks: 70

Time: 3 Hours

Answer all five units by choosing one question from each unit ( 5 x 14 = 70 Marks )

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**UNIT-I**

1. a) Change the order of integration in  $\int_0^1 \int_0^{\sqrt{1-x^2}} y^2 dx dy$  and hence evaluate. 14M

**OR**

2. a) Show that the area between the parabolas  $y^2 = 4ax$  and  $x^2 = 4ay$  is  $\frac{16}{3}a^2$  7M

- b) evaluate  $\int_0^{\frac{\pi}{2}} \int_0^{a \sin \theta} \int_0^{(a^2-r^2)/a} r dz dr d\theta$  7M

**UNIT-II**

3. a) Find the Laplace transform of  $te^{-t} \sin t dt$  7M

- b) Evaluate  $\int_0^{\infty} te^{-3t} \sin t dt$  7M

**OR**

4. a) Using Convolution theorem, find the inverse transform of  $L^{-1} \left\{ \frac{1}{s(s^2+4)} \right\}$  7M

- b) Find  $L^{-1} \left\{ \log \frac{s+1}{s-1} \right\}$  7M

**UNIT-III**

5. Using transform method solve  $\frac{d^2x}{dt^2} - 2\frac{dx}{dt} + x = e^t$  with  $x = 2$ ,  $\frac{dx}{dt} = -1$  at  $t=0$  14M

**OR**

6. Solve  $\frac{d^2y}{dt^2} + 2\frac{dy}{dt} - 3y = \sin t$ ,  $y = \frac{dy}{dt} = 0$  when  $t=0$ . 14M

**UNIT-IV**

7. a) Show that  $\nabla^2 r^n = n(n+1)r^{n-2}$  7M

- b) Find the work done in moving a particle in the force field  $\vec{F} = 3x^2\vec{i} + (2xz - y)\vec{j} + z\vec{k}$  along the Straight line from (0,0,0) to (2,1,3) 7M

**OR**

8. Evaluate the line integral  $\int_c (x^2 + xy)dx + (x^2 + y^2)dy$  when c is the square formed by the lines  $y = \pm 1$  and  $x = \pm 1$  14M

**UNIT-V**

9. Verify Green's theorem for  $\int_c [(xy + y^2)dx + x^2dy]$  where c is bounded by  $y=x$  and  $y=x^2$  14M

**OR**

10. Verify Stokes Theorem for  $\vec{F} = (2x - y)\vec{i} - yz^2\vec{j} - y^2z\vec{k}$  over the upper half surface of the sphere  $x^2 + y^2 + z^2 = 1$  bounded by its projection on the xy-plane. 14M

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**Code: 5G522**

I B.Tech. II Semester Regular &amp; Supplementary Examinations June 2017

**Engineering Graphics-II**

( Common to CE &amp; ME )

Max. Marks: 70

Time: 3 Hours

Answer *all five* units by choosing one question from each unit ( 5 x 14 = 70 Marks )

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**UNIT-I**

1. A pentagonal pyramid 30 mm side of base and axis 75mm long is resting on one of its base corner on H.P. Draw its projections, when its axis is inclined at  $45^{\circ}$  to H.P and  $30^{\circ}$  to V.P.

**OR**

2. A cone of base 80 mm diameter and height 100 mm is lying with one of its generators on H.P. Draw its projections when the axis appears to be inclined to the reference line at an angle of  $40^{\circ}$  in the top view.

**UNIT-II**

3. A cylinder of 50 mm diameter and axis 70 mm long, lies on H.P on one of its generators such that, the axis is inclined at  $45^{\circ}$  to V.P. A section plane parallel to V.P passes through the farthest point of the visible base. Draw the projections of the cut solid.

**OR**

4. A hexagonal pyramid, with edge of base 40 mm and axis 85 mm long, is lying on H.P on one of its triangular faces, with the axis parallel to V.P. A vertical section plane, the H.T of which makes an angle of  $45^{\circ}$  with reference line, passes through the center of the base and cuts the pyramid; the apex being retained. Draw the top view, sectional front view and true shape of the section.

**UNIT-III**

5. A cube of 50 mm edge is resting on a face on H.P such that, a vertical face is inclined at  $30^{\circ}$  to V.P. It's cut by a section plane perpendicular to V.P and inclined to H.P at  $30^{\circ}$  and passing through a point at 12 mm from the top end of the axis. Develop the lateral surface of the lower portion of the cube.

**OR**

6. A vertical cylinder of 70 mm diameter is penetrated by a horizontal cylinder of the same size. The axis of horizontal cylinder is parallel to both H.P and V.P and is bisecting the axis of the vertical cylinder. Draw the projections showing the lines of intersection.

**UNIT-IV**

7. Draw the isometric projection of a cylinder of radius 25 mm and axis 50mm resting on its base centrally on the top of a square prism of side 60 mm and height 25 mm. The sides of the square are equally inclined to V.P.

**OR**

8. The frustum of a hexagonal pyramid side of top and bottom 25 mm and 40 mm respectively, with axis 50 mm height rests on its base in H.P. Its axis is parallel to V.P. Draw its isometric view.



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**R-15**

**Code: 5GC23**

*I B.Tech. II Semester Regular & Supplementary Examinations June 2017*

**Engineering Physics**

( Common to CE, ME, CSE and IT )

Max. Marks: 70

Time: 3 Hours

Answer *all five* units by choosing one question from each unit ( 5 x 14 = 70 Marks )

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**UNIT-I**

1. Discuss about the diffraction at double slit and diffraction grating 14M

**OR**

2. Describe the Numerical aperture and acceptance angle. 14M

**UNIT-II**

3. a) State and derive Bragg's law for diffraction in crystals. How this is useful in crystal structure determination? 10M

- b) Why x-rays are preferred for crystal diffraction than visible light? 4M

**OR**

4. How ultrasonics are used for non-destructive testing of materials? 14M

**UNIT-III**

5. a) Explain the energy and wave function of an electron in potential box 10M

- b) Calculate the energy of 4<sup>th</sup> state of an electron in a box of width 1nm 4M

**OR**

6. a) With suitable picturization of potential well and imposed boundary conditions, derive the Schrödinger equation for metallic electron and prove that energy levels are equally spaced 10M

- b) Calculate the energy and momentum of an x-ray photon whose wavelength is  $2 \times 10^{-11} \text{m}$  4M

**UNIT-IV**

7. a) Explain hysteresis process in terms of domain structure of ferromagnetic materials. 8M

- b) Explain the significance of hysteresis loop and importance of hysteresis in selection of materials for different applications. 6M

**OR**

8. a) Describe different types of magnetic materials in terms of their spin dipole alignment and its temperature dependence. 10M

- b) Define magnetic dipole moment. List out various sources of magnetic dipole moment in magnetic materials. 4M

**UNIT-V**

9. a) Analyze the two main processes used for synthesis of nanomaterials 6M

- b) Discuss the synthesis of nanomaterials by ball milling method 8M

**OR**

10. a) Write a note on i) Penetration Depth ii) Flux quantization 10M

- b) Josephson's junction having a voltage of  $8.5 \mu\text{V}$  across its terminals, and then calculate its generating electromagnetic frequency. 4M

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Hall Ticket Number :

R-15

Code: 5GC21

I B.Tech. II Semester Regular & Supplementary Examinations June 2017

**Technical English**

( Common to All Branches )

Max. Marks: 70

Time: 3 Hours

Answer all five units by choosing one question from each unit ( 5 x 14 = 70 Marks )

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**UNIT-I**

1. a) What are the problems unsolved by technology as identified by E. F. Schumacher in his essay? 7M  
b) Define 'social time' as used by E. F. Schumacher. State its significance. 7M

**OR**

- 2 a) Mention and describe factors that cause climatic change over long periods of time. 7M  
b) Do as directed.  
i. The plan was approved by our clients. [Change the voice]  
ii. Expand the following compound nouns. 1) Driving licence 2) Car battery  
iii. But for his quickness I (be) killed. [Fill in the blank with appropriate tense form of the verb given in the bracket].  
iv. In \_\_\_problem solving message, start with the problem you share. [Use articles]  
v. Correct the following spellings. 1) mnemoncs 2) evaluvate  
vi. Choose the word that is the antonym of the underlined word.  
The man collapsed under the sun.  
a. stood up b. sat up c. got up d. revived e. survived  
vii. Fill in the blank using the appropriate form of the verb (gerund or infinitive) in the following sentence.  
Your English seems ----- (improve) a lot. 7M

**UNIT-II**

3. a) What are the long term strategies proposed by the author to deal with climate change? 7M  
b) What is the relationship between human development and climate change? 7M

**OR**

4. a) Analyze the climate change with respect to temperature. 7M  
b) Read the following advertisement and draft a job application/cover letter.

**WANTED MARKETING EXECUTIVE**

A well-established company invites applications from competent marketing executive. Our requirements (a) University degree [B.E./B.Tech] (b) Industry experience (c) Good command over English. Please apply with full career details to the Human Resources Manager, P.O. Box 12456 7M

**UNIT-III**

5. a) What are the advanced and emerging solar technologies available in Spain? 7M  
b) Define photovoltaic effect. Briefly explain its operation. 7M

**OR**

6. a) Explain the principles of tower technology. 7M  
b) As the Personnel Manager of a Multinational firm draft an **e-mail** to be sent to those candidates who were not selected in the interview conducted few days before. 7M



**UNIT-IV**

7. a) State the importance and uses of water. 7M  
 b) Why does Sir C.V. Raman call water as “elixir”? Explain the reasons. 7M

**OR**

8. a) Explain how soil erosion affects agriculture and irrigation. 7M  
 b) Write a technical report on computer animation. 7M

**UNIT-V**

9. a) Why does Swami Vivekananda consider ignorance as mother of all evils? 7M  
 b) What are the central ideas of Gita? Explain. 7M

**OR**

10. a) Describe the salience of the meeting between Kalam and Wernher Von Braun. 10M  
 b) Vocabulary Test: Match the words in column A with their meaning in column B.

A

- (a) carcass  
 (b) contagion  
 (c) banish  
 (d) amicable

B

- (1) spreading by contact  
 (2) dead body of an animal  
 (3) in a friendly manner  
 (4) send away forcefully

4M

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