

Hall Ticket Number :

R-15

Code: 5G521

I B.Tech. II Semester Supplementary Examinations December 2017

Engg Mechanics -Dynamics

(Common to CE & ME)

Max. Marks: 70

Time: 3 Hours

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

UNIT-I

1. Two guns are pointed at each other, one upward at an angle of 30° and the other at same angle of depression the muzzles being 30m apart. If the guns are shot with velocities of 350 m/s upwards and 300 m/s downwards respectively, find when and where they will meet? 14M

OR

2. A bullet is fired upwards at an angle of 30° to the horizontal from a point P on a hill and it strikes a target which is 80m lower than B. The initial velocity of the bullet is 100 m/s. Calculate:
(i) The maximum height to which the bullet will rise above the horizontal
(ii) The actual velocity with which it will strike the target
(iii) The total time required for the flight of the bullet
Neglect the resistance due to air. 14M

UNIT-II

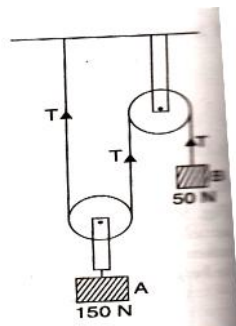
3. A wheel rotating about a fixed axis at 20 rpm is uniformly accelerated for 70 seconds, during which time it makes 50 revolutions. Calculate
(i) Angular velocity at the end of interval
(ii) Time required for the speed to reach 100 rpm 14M

OR

4. a) The angular rotation in radians of an accelerated flywheel is given by $= \frac{9}{32} t^3$. Find its angular acceleration when $t = 1.6s$ 7M
b) Derive the equations of motion of a body moving along a circular path with uniform angular acceleration. 7M

UNIT-III

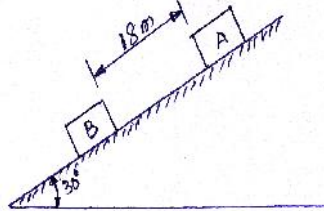
- 5 Determine the tensions in the strings and accelerations of blocks A and B weighing 150N and 50N connected by a string and a frictionless and weightless pulley as shown in figure.



14M

OR

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



14M

UNIT-IV

7. A bullet of mass 25 gram, moving horizontally with a velocity of 600 m/s strikes a wooden block of mass 5 kg resting on a rough horizontal surface. The bullet after striking the block remains buried in the block and both travels a distance of 90cm, before coming to rest. Determine
- Average resistance between block and horizontal surface
 - Co-efficient of friction between block and horizontal surface

14M

OR

8. A jet of water impinges on a symmetrically curved vane at its center. The velocity of the jet is 60 m/s and the diameter 120 mm. The jet is deflected through an angle of 120° . Calculate the force on the vane if the vane is fixed. Also determine the force if the vane moves with a velocity of 25 m/s in the direction of the jet.

14M

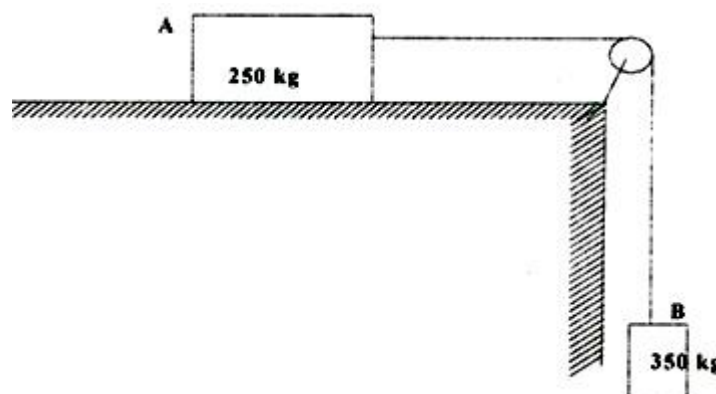
UNIT-V

9. A right circular cylinder of weight 100 N and radius 20 cm is suspended from a cord that is wound around its circumference. If the cylinder is allowed to fall freely, find the acceleration of its mass center and the tension in the cord.

14M

OR

10. An inextensible string passing over a smooth pulley as shown in figure joins two blocks. If the blocks are released simultaneously from rest, determine the velocity of block A after it has moved over 2 m and the tension in the string. Assume that the coefficient of friction at the contact surface is 0.2. Use energy principle.



14M

Code: 5G121

I B.Tech. II Semester Supplementary Examinations December 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)

UNIT-I

1. a) Write short notes on Pointer expression and pointer arithmetic. 7M
b) Write a 'C' program to implement Dynamic Memory Allocation concept. 7M

OR

2. a) Define pointer increments and scale factor. Give two examples for each. 7M
b) Write a 'C' program to declare an array and a pointer and access the values of the array variable using the pointer. 7M

UNIT-II

3. a) Write short notes on
i) Dot operator(.) 7M
ii) Arrow operator(->) 7M
b) Write a 'C' program to open a file and read a text using getc() function. Using putc() function print the same text on the screen. 7M

OR

4. a) What is the logic behind in Exchange sort technique? Sort the following elements using it.
68 45 12 98 51 73 44 5 7M
b) List out any 7 standard library functions for files and discuss their meanings. 7M

UNIT-III

5. a) How to convert an Infix expression into a Postfix expression, explain.
Convert the following infix expression into postfix expression
(A+B)*(C-D)/E 7M
b) Write a 'C' program to implement the stack operations using Linked list. 7M

OR

6. a) What are the various operations can be performed on a circular queue, explain. 7M
b) Write a 'C' program to implement the Queue operations using Arrays. 7M

UNIT-IV

7. Discuss the following operations on a Single Linked List with proper diagrams.
i). Copying a single linked list ii). Merging two single linked lists 14M
iii). Deletion at all positions.

OR

8. How to represent a doubly linked list? Write the algorithms to insert and delete operations in doubly linked list. 14M

UNIT-V

9. What are the Traversal operations possible on a Binary tree? Write the algorithms for all traversal operations. 14M

OR

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

Code: 5GC24

I B.Tech. II Semester Supplementary Examinations December 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)

UNIT-I

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

OR

2. a) Evaluate $\int_0^a \int_0^x \int_0^{x+y} e^{x+y+z} dz dy dx$ 7M

- b) Find the area of the plate in the form of a quadrant of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ 7M

UNIT-II

3. a) Find the Laplace transform of $\int_0^t \frac{e^{-t} \sin t}{t} dt$ 7M

- b) Evaluate $\int_0^{\infty} t e^{-2t} \cos t dt$ 7M

OR

4. a) State and prove Convolution Theorem 7M

- b) Using Convolution Theorem find $L^{-1} \left\{ \frac{s}{(s^2 + a^2)^2} \right\}$ 7M

UNIT-III

5. Using Laplace transforms solve $(D^3 - 3D^2 + 3D - 1)y = t^2 e^t$ given that $y(0) = 1, y'(0) = 0, y''(0) = -2$ 14M

OR

6. Using Laplace transforms solve $ty'' + 2y' + ty = \cos t$ given that $y(0)=1$ 14M

UNIT-IV

7. a) Find the directional derivative of $f(x,y,z) = xy^2 + yz^3$ at the point (2, -1,1) in the direction of the vector $\vec{i} + 2\vec{j} + 3\vec{k}$ 7M

- b) If $u\vec{F} = \nabla v$, where u, v are scalar fields and \vec{F} is a vector field, show that $\vec{F} \cdot \text{curl} \vec{F} = 0$ 7M

OR

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

UNIT-V

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

OR

10. Verify Stokes Theorem for vector field defined by $\vec{F} = -y^3\vec{i} + x^3\vec{j}$ in the region $x^2 + y^2 \leq 1, z = 0$ 14M

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Code: 5GC22

I B.Tech. II Semester Supplementary Examinations December 2017

Engineering Chemistry

(Common to EEE & ECE)

Max. Marks: 70

Time: 3 Hours

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

UNIT-I

1. a) What is the principle of EDTA titration? Briefly describe the estimate of hardness of water by EDTA method. 10M
- b) What are the advantages of break-point chlorination? 4M

OR

2. a) Explain the boiler troubles, scale and caustic embrittlement in details. 8M
- b) Why is calgon conditioning better than phosphate conditioning? 6M

UNIT-II

3. a) How is NICAD battery constructed? Explain with cell reaction. 7M
- b) Write a brief note on H₂-O₂ fuel cell. 7M

OR

4. a) Discuss the mechanism of chemical and electrochemical corrosion. 7M
- b) Write a brief note on cathodic protection methods. 7M

UNIT-III

5. a) What is synthetic rubber? Is vulcanization essential for all synthetic rubbers? 7M
- b) Distinguish thermoplastics and thermosetting plastics. 7M

OR

6. a) Discuss the preparation, properties and uses of Buna-S rubbers. 7M
- b) What are conducting polymers? Discuss possible categories of conducting polymers with suitable examples. 7M

UNIT-IV

7. a) Calculate the gross and net calorific values of coal having the following compositions, carbon = 85%, hydrogen = 8 %, Sulphur = 1 %, nitrogen = 2 %, ash = 4 %, latent heat of steam = 587 cal/gm. 6M
- b) Describe the Otto-Hoffman method of coke manufacture and the recovery of various by product. 8M

OR

8. a) What is synthetic petrol? How is it manufactured by Bergius process? 7M
- b) With a neat diagram explain the analysis of flue gas by Orsat apparatus and mention the precautions to be followed during the analysis. 8M

UNIT-V

9. a) Explain the different raw materials and mixing of the raw materials by the dry process during the manufacture of cement. 7M
- b) What are Refractories? Explain Thermal spalling, strength and porosity of the refractories. 7M

OR

10. a) Write short notes on the following properties of lubricants:
 (i) Cloud and Pour point
 (ii) Flash and Fire point. 7M
- b) Explain the classification of explosive.
 (i) Primary or initiating explosives,
 (ii) Low explosives or propellants. 7M

Code: 5G522

I B.Tech. II Semester Supplementary Examinations December 2017

Engineering Graphics-II

(Common to CE & ME)

Max. Marks: 70

Time: 3 Hours

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

UNIT-I

1. a) A pentagonal pyramid of 25 mm base edges and axis 60 mm long is lying on its base on H.P such that one of its base edges is perpendicular to V.P. Draw its projections
- b) A cylinder of base diameter 30 mm and axis 60 mm has one of its circular ends on V.P such that the axis is at 40 mm from H.P. Draw its projections.

OR

2. A hexagonal prism of side of base 30 mm and axis 75 mm long, has an edge of the base on V.P and inclined 30° to H.P. The triangular face containing the edge makes an angle of 45° with V.P. Draw the projections of the solid.

UNIT-II

3. Draw the projections of a cylinder of diameter 60 mm and 90 mm long, lying on V.P on one of its generators, with its axis inclined 60° to H.P with the axis making an angle of 30° to V.P. It is cut by a section plane, perpendicular V.P, inclined at 45° to H.P and passing through the mid - point of the axis. Draw the sectional top view and determine the true shape of the section

OR

4. A cone of base 65 mm diameter and axis 75 mm long rests on H.P on a point on the circumference of the base. The axis of the cone makes 60° with H.P. It is cut by a section plane, inclined at 30° to V.P and passing through the mid -point of the axis. Draw the sectional front view and determine the true shape of the section.

UNIT-III

5. Draw the development of a cylinder of 50 mm diameter and 75 mm height, containing a square hole of 25 mm side. The sides of the hole are equally inclined to the base and the axis of the hole bisects the axis of the cylinder.

OR

6. A vertical cone with diameter of base 90 mm and axis 100 mm long, is penetrated by a horizontal cylinder of 50 mm diameter. The axis of the cylinder intersects the axis of the cone at a point 30 mm from the base. Draw the projections of the solids, showing the lines of intersection.

UNIT-IV

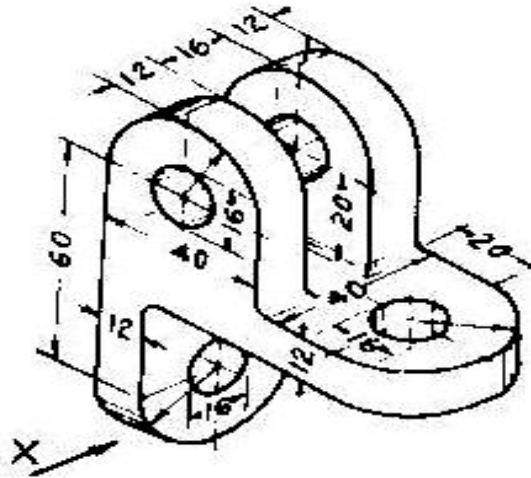
7. Draw an isometric projection of a right circular cone resting vertically and centrally on the top of pentagonal slab having one of its rectangular face perpendicular to the observer, side of pentagon = 46 mm, thickness of slab = 30 mm, diameter of cone = 40 mm and height of cone = 60 mm.

OR

8. A cylinder of diameter 40 mm and axis 30 mm rests centrally on a square prism of side 50 mm and height 35 mm. Draw the isometric view of the combination of solids.

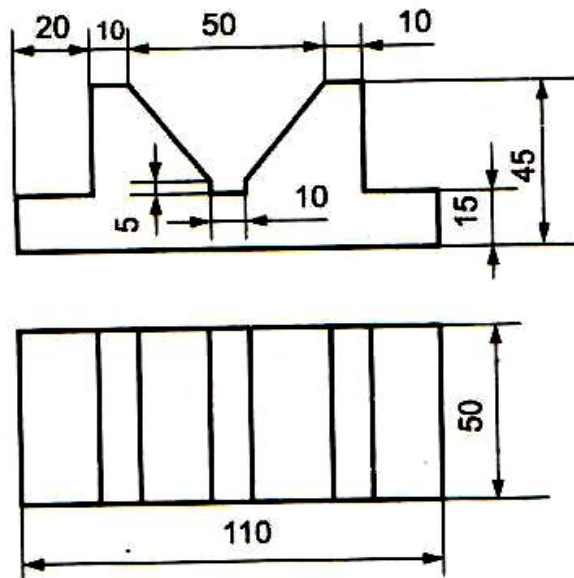
UNIT-V

9. Draw the front view, top view and side view for the following figure



OR

10. Draw the isometric view of the following figure



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Code: 5GC23

I B.Tech. II Semester Supplementary Examinations December 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)

UNIT-I

1. a) Explain Newton's rings experiment by reflection to calculate the wavelength of a monochromatic light. 5M
- b) Derive Einstein's coefficients in LASERS. 5M
- c) Write the applications of optical fibers in industries and in medical field. 4M

OR

2. a) Give the theory of Fraunhofer diffraction due to single slit. 5M
- b) Explain population inversion. Mention important applications of LASERS 4M
- c) Derive the expression for acceptance angle and Numerical Aperture of an Optical fiber. 5M

UNIT-II

3. a) Derive an expression for inter-planar spacing in cubic system. 5M
- b) Define Miller Indices and mention the steps involved. Sketch (110) & (001) the planes in a cube. 5M
- c) Define point defects? Explain different types of point defects. 4M

OR

4. a) Describe with suitable diagram the Laue method of X-ray diffraction and give the consequences 5M
- b) Explain different types of line defects. How the burger's vector is used to find the edge and screw dislocations? 5M
- c) Write note on production of ultrasonics by piezoelectric method. 4M

UNIT-III

5. a) What are matter waves? Explain their properties. 4M
- b) Show that the energies of a particle in 1-D potential box are quantized. Explain the physical significance of wave function. 7M
- c) Calculate the de Broglie wavelength associated with an electron when it is raised to a potential of 1600 V. 3M

OR

6. a) What are drawbacks of classical free electron theory of metals? How are these are removed by the application of quantum states? 5M
- b) Show that the Kronig - Penney model leads to existence energy bands in solids. 5M
- c) Give the classification of solids into metals, semiconductors and insulators on the basis of band theory of solids. 4M

UNIT-IV

7. a) Describe drift and diffusion currents in a semiconductor. Derive their expressions. 6M
b) Derive the equation of continuity equation for electrons. 5M
c) Draw I-V characteristic curve of a PN junction diode and explain. 3M

OR

8. a) Explain the origin of magnetic moment in atoms. Find the magnetic dipole moment due to orbital and spin motions of an electron. 5M
b) Explain hysteresis of a ferromagnetic materials. 4M
c) Explain the classification of magnetic materials. 5M

UNIT-V

9. a) Explain Meissner effect. Write notes on magnetic levitation. 5M
b) Describe BCS theory of superconductivity. 5M
c) Write applications of superconductors. 4M

OR

10. a) Explain the basic principles of nanomaterials. 5M
b) Describe the process of “sol-gel” and “chemical vapour deposition” method of fabrication of nanomaterials. 6M
c) Write the applications of nanomaterials. 3M

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R-15

Code: 5GC21

I B.Tech. II Semester Supplementary Examinations December 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)

UNIT-I

- 1. a) How does technology effect work-life balance as explained by E. F. Schumacher in his essay? 7M
- b) Analyse E. F. Schumacher's idea, "production by the masses" as an economic booster. 7M

OR

- 2. a) Why does E. F. Schumacher consider technology as inhuman? 7M
- b) Do as directed.

i) Rewrite the words by adding suitable prefixes/suffixes in accordance with the meaning given against each:

- A. Micro-----: instrument for seeing
- B. Techno -----: a person versed in technology
- C. Geo-----: study of earth
- D. Aero-----: a mode of transport

ii) Choose the word that is the antonym of the underlined word.

- I. My English professor gave a dull description.
a. glowing b. realistic c. vivid d. visual e. bold
- II. Wall Street is a crowded street.
a. lonely b. desolate c. empty d. barren e. deserted

iii) They _____the fire in an hour. (Fill in the black with a phrasal verb with 'put') 7M

UNIT-II

- 3. a) What are the solutions suggested by E. K. Federov to tackle climate change? 7M
- b) What are the parameters which are responsible for the stability of climate? 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.
A well-established Information Technology company invites applications from Computer Engineers. Requirements (a) First class in B.E./B.Tech (b) One year industry experience (c) Good communication skills. Please apply with full career details to the Human Resources Manager, P.O. Box 12934. 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 a solar thermal collector. 7M
- b) Draft an e-mail to your friend describing your recent holiday experience in a hill station. 7M

UNIT-IV

7. a) What is the role of the flow of water in geological processes? 7M
 b) Why does Sir C.V. Raman call water as “elixir”? Explain the reasons. 7M

OR

8. a) How does Sir C.V. Raman poetically describe water in the beginning of the essay? 7M
 b) Write a technical report on ‘recycling’. 7M

UNIT-V

9. a) Explain the concept of ‘unattachment’ as explained by Swami Vivekananda. 7M
 b) Why does Swami Vivekananda compare human beings with tortoise? 7M

OR

10. a) Describe the work culture developed by Kalam. 10M
 b) Do as directed:
 i) Change the voice.
 a. The same day we got our puppy, Sputnik was sent into space by the Russians.
 b. The plan was approved by our clients.
 ii) Vocabulary test: In each of the following questions, out of the four alternatives, choose the one which can be substituted for the given expression.
 a. Life history of a person written by another.
 A) Bibliography B) Autobiography C) Memoir D) Biography
 b. A person who does not believe in religion
 A) Pagan B) Rationalist C) Atheist D) Philatelist 4M
