

FACULTY OF ENGINEERING
B.E. II-Semester (Backlog) Examination, May / June 2019

Subject : Engineering Mechanics – II

Time : 3 Hours

Max. Marks: 70

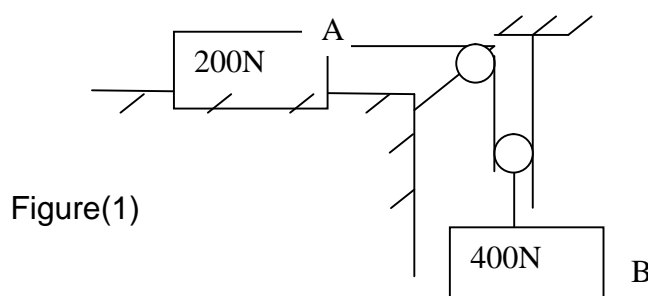
Note: Answer all questions from Part-A & any five questions from Part-B.

PART – A (20 Marks)

- 1 Define centre of gravity
- 2 State transfer formula for mass of inertia
- 3 A body is moving with a velocity of 3m/sec. After 2 seconds the velocity becomes 8m/sec. Find the acceleration of the body.
- 4 Define general plane motion with an example.
- 5 State D' Alembert's principle
- 6 A lift weighing 9 kN moves up with an acceleration of 3m/sec^2 . Determine the tension in the cable of the lift.
- 7 State the work energy principle in translation.
- 8 A spring of stiffness 12N/mm is pulled from an extension of 2 mm to an extension of 4 mm. Calculate the work done
- 9 State the principle of conservation of linear momentum of a particle.
- 10 Define coefficient of restitution.

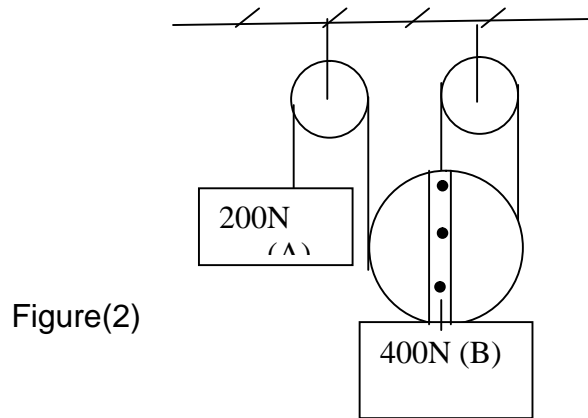
PART – B (50 Marks)

- 11 A steel ball of 300mm diameter is centrally mounted on the top of a cylinder of 400mm diameter and 1000mm height. Find moment of inertia about its vertical centroidal axis. Timber weighs 1850kg/cu.m and steel weighs 9250kg/cu.m.
- 12 The velocity of a particle moving along X-axis is defined by $v=kx^3-4x^2+6x$, where x in meters and 'k' is a constant. If $k=1$, compute the value of the acceleration when $x=2$. Also find the smallest value of 'k' that will make the acceleration equal to 16m/s^2 at $x=3$.
- 13 (a) A projectile is fired from the top of a hill of 100m high, with a velocity of 300m/sec at an angle of 30° to the horizontal. Calculate the horizontal range of the projectile from the base of the hill.
 (b) When the angular velocity of a 1.2m diameter pulley is 3 rad/sec, the total acceleration of a point on its rim is 10m/s^2 . Determine the angular acceleration of the pulley at this instant.
- 14 Determine the acceleration of the bodies in figure(1) if the coefficient of friction is 0.2 at all contact surfaces.



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- 15 Assuming the pulleys in figure(2) to be frictionless and weightless, find the velocity of body 'B' after it has moved 3m from rest.



- 16 A bullet weighing 0.3N and moving at 600m/sec penetrates a body of 50N which is resting on a horizontal surface with $\mu_k = 0.3$ and bullet emerges with a velocity of 120m/sec. How far and how long does the body then move?
- 17 Write notes on any THREE of the following:-
- Principle of virtual work
 - Rectilinear and curvilinear motion
 - Instantaneous centre
 - Types of Impacts

FACULTY OF ENGINEERING**B.E. II-Semester (CBCS) (Backlog) Examination, May / June 2019****Subject : Elements of Mechanical Engineering****Time: 3 Hours****Max. Marks: 70**

Note: Answer all questions from Part -A and any five questions from Part-B.

PART-A (10x2 =20 Marks)

- 1 What is closed thermodynamic system
- 2 State zeroth law of thermodynamics
- 3 What is indicated power of IC engine
- 4 What is the purpose of Valve Timing diagram in IC engines
- 5 On what properties the phenomenon of Heat Transfer depends?
- 6 State two points the role of heat exchangers in industry
- 7 Draw a neat sketch of spur gear and name its nomenclature
- 8 State two conditions on which gear drive is preferred over belt drive in power Transmission.
- 9 What are reasons for using non-traditional methods like EDM, EBM etc in metal removal to realize the required shape of part.
- 10 State one critical difference between welding, forming, and machining in realization of a manufactured part.

PART-B (5x10=50 Marks)

11. a) Differentiate between heat pump and Refrigerator with neat sketch
b) State the law of thermodynamics and explain with sketch
- 12 a) Explain the principle of petrol and diesel engine with help of p-v diagram
b) Derive the air cycle operational efficiency of Reciprocating Air Compressor
- 13 a) Explain how temperature of object can be measured using Stefan - Boltz man law of radiation
b) Explain the five (5) applications of heat Exchangers in Industrial practices
- 14 a) Derive the condition for maximum power transmission for flat belt with neat diagram
b) Sketch compound gear and state five applications of its
- 15 a) Sketch neat diagram of sand casting process procedure and explain its working
b) Sketch and explain forming processes-(i) extrusion (ii) rolling
- 16 a) Derive the 1-D steady state conduction of heat through single wall without heat generation
b) Explain the concept of property of a thermodynamical system with a neat sketch
- 17 a) Explain the two problems each for (i) creep and (ii) slip in belt drives
b) Derive the LMTD for parallel flow Heat Exchanger

FACULTY OF ENGINEERING

B.E. II – Semester (CBCS) (Backlog) Examination, May / June 2019

Subject: Basic Circuit Analysis

Time: 3 hours

Max. Marks:70

Note: Answer all questions from Part A & any five questions from Part B

Part – A (20 Marks)

1. Two resistors R1 and R2 are connected in parallel. If Req = 20 Ohms and R1 = 40 ohms. Calculate R2. (2)
2. Briefly explain source transformation. (2)
3. Given time constant is 1 sec. Calculate the value of capacitance given R = 1 K ohm. (2)
4. Discuss the conditions for over damped, critically damped and under damped response. (2)
5. Given $Z = 3 + j5$. Express Z in terms of phasor form and Calculate the power factor. (2)
6. What is self inductance and mutual inductance? Give expressions? (2)
7. Give the two port network model for Z parameters. (2)
8. What is an auto transformer? (2)
9. Obtain the poles and zeros for the function $H(S) = \frac{(S+1)}{(S-2)(S+4)}$. (2)
10. Define resonance and give expression of resonant frequency for series resonant circuit. (2)

PART – B (5 x 10 = 50 Marks)

11. a) State the superposition theorem and calculate the value of V_x in the following circuit using superposition theorem. (7)

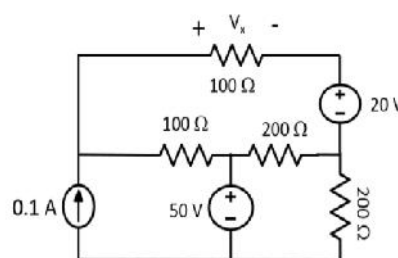
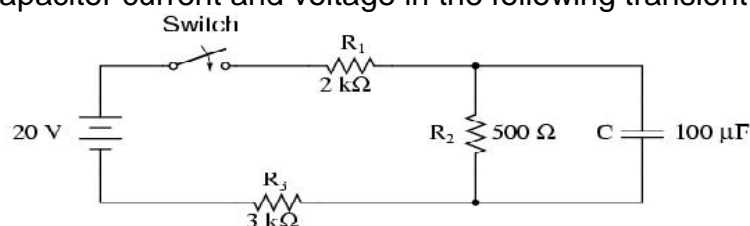


Figure 1

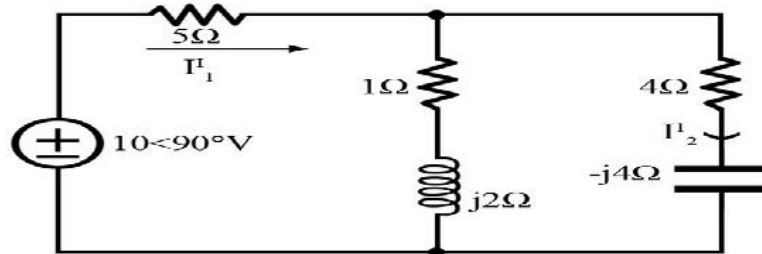
- b) What is network duality? Mention five components and their duals. (3)
12. a) Obtain the capacitor current and voltage in the following transient circuit. (7)



- b) Define natural response, forced response and complete response. (3)

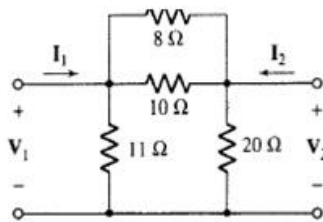
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13. a) Obtain Thevenin's equivalent of the following circuit considering $(1+j2)$ ohm as load impedance. (7)



- b) Calculate average power, apparent power and power factor for the circuit which is having a voltage of $V(t) = 50 \cos \omega t$ and $i(t) = 20 \cos (\omega t - 45^\circ)$. (3)

14. a) Calculate the Z parameter of the two port network given below and obtain hence calculate its h parameters using Z to h conversion expressions. (7)

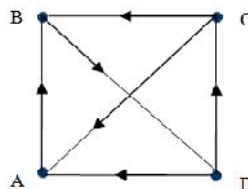


- b) State reciprocity theorem and mention the condition for reciprocity in terms of γ parameter. (3)

15. a) Derive the relationship between resonant frequency, bandwidth and quality factor for a series resonant circuit. (7)

- b) Calculate cutoff frequencies for series resonant circuit given $F_o = 200$ KHz and $BW = 60$ KHz. (3)

16. a). Obtain the incidence matrix and reduced incidence matrix for the following graph. (5)



- b) State and prove maximum power transfer theorem. (5)

17. Write short notes on the following (3+3+4)

- DOT convention
- ABCD Parameters
- Tank circuit

FACULTY OF ENGINEERING**B.E. II – Semester (CBCS) (Backlog) Examination, May / June 2019****Subject: Object Oriented Programming using C++****Time: 3 Hours****Max.Marks: 70****Note: Answer all questions from Part-A and any five questions from Part-B****PART – A (10x2 = 20 Marks)**

- 1 What do you meant by life and scope of a variable?
- 2 What are the different function call mechanisms?
- 3 Write the definition of pointer variable with respective syntax?
- 4 What is a Template?
- 5 List any five keywords in C++ to handle exceptions.
- 6 Differentiate multiple and multilevel inheritance.
- 7 Differentiate Run-Time and Compile-time polymorphism
- 8 Give the syntax of operator function
- 9 How template is acting as an alternative for inheritance?
- 10 In linked list implementation of a queue, the condition for a queue to be empty is?

PART – B (5x10 = 50 Marks)

- 11 State the important features of object oriented programming. Compare the object oriented system, with procedure oriented system. [10]
- 12 What is a friend class? Illustrate its use with example. [10]
- 13 a) Is it possible to call functions declared in other languages? Justify your answer by taking an example [5]
b) Write a C++ program to sort an integer array in ascending order using pointer function. [5]
- 14 Write a program to perform multiplication of two complex numbers by **overloading** operator. [10]
- 15 Write a C++ program to implement the stack operation. [10]
- 16 a) What is function template? Explain the purpose of function templates with suitable example? [8]
b) What is template argument deduction? [2]
- 17 Write short notes on the following: [10]
i) IO Streams in C++
ii. 'This' pointer in C++
