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B. Tech. Engineering Physics

Mid Semester Examination

ME-251 Engineering Mechanics

Time 1h:30 min.

Roll No. 048

3rd Semester

(September-2017)

Max. Marks: 25

NOTE: Attempt all Questions. Assume suitable missing data if any.
All questions carry equal mark

Q1. The following forces are applied to a rigid body initially at rest:

$$F_1 = 2i + j + 3k \text{ at } (7, 2, 3), F_2 = i - 2j - 4k \text{ at } (5, 1, 0),$$

$$F_3 = -2i + 2j + 2k \text{ at } (4, 0, -1), F_4 = -i - j - k \text{ at } (2, 2, 1).$$

Show that the body is in equilibrium.

Q2. A pin jointed frame is supported and loaded as shown in Fig. 1. Find the magnitude and nature of force in each of the members due to a load of 10kN at the apex. Given $AB=BC=AC=3\text{m}$.

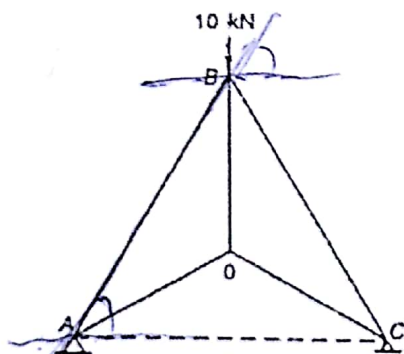


Fig. 1

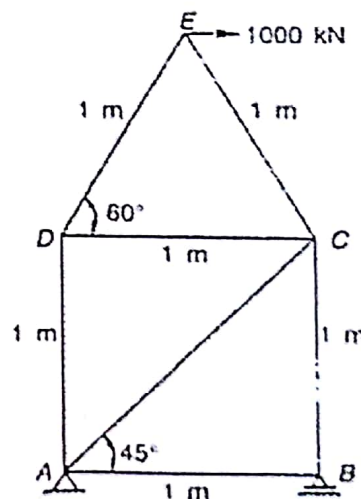


Fig. 2

Q3. A simple structure ABCDE is supported on a hinge at A and on rollers at B while it carries a horizontal force of 1000kN at E as shown in Fig. 2. Determine the force in member AC, using both the method of joints and the method of sections.

Q 4/ Draw the SF and BM diagrams for the beam as shown in Fig. 3. Also locate the points of contraflexure.

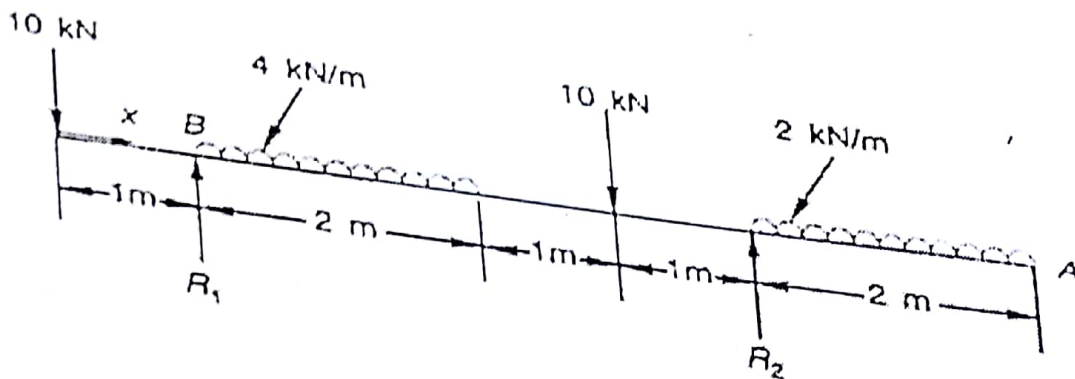


Fig. 3

Q 5/ A load of 18kN is acting to the member CEF of the frame at point D as shown in Fig. 4. The frame is supported at point A by simple pin joint and at point F by roller support. Determine all the reaction at pins (at B, C and E) and supports (A, F).

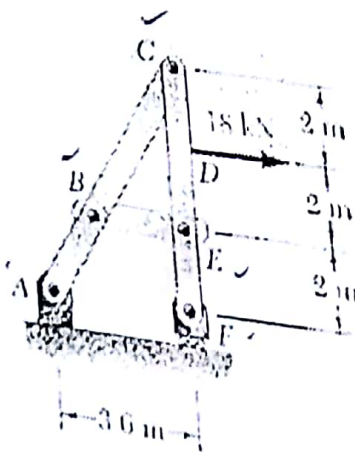


Fig. 4

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Roll No. Q.92

THIRD SEMESTER

B.Tech. [EP]

MID SEMESTER EXAMINATION

(SEPT.-2017)

EP-201 INTRODUCTION TO COMPUTING

Time: 1 Hour 30 Mins

Max. Marks: 30

Note: Attempt all the questions. Use comment line in each program to write the script/function file name.

1. (a) In planar waveguide, normalized waveguide parameter V is defined by $V = 2\pi d(n_1^2 - n_2^2)^{1/2} / \lambda$, where d is the guiding film width, λ is the wavelength of the light used and n_1 and n_2 are the refractive indices of the guiding core and substrates. Such a waveguide supports the total number of modes which is an integer closest to (and greater than) V / π . Write a Matlab program to tabulate the number modes supported by the waveguide at wavelengths ranging from 1.0 μm to 5 μm in step of 0.05 μm (one column for wavelength and next column for corresponding number of modes). [Make user controlled input which should prompt in the command window after executing the file] [5]

(b) Write down the various matrix and array operators. Explain the difference between Matrix and Array Operation by taking suitable examples. [5]

2 (a). In Fabry Perot Interferometer the expression for total amplitude due to interference of " n " transmitted waves in the transmitted region is given by $A_{Trans} = \sum_{n=1}^N A_0 T R^{n-1} e^{i(n-1)\delta}$. T and R are the transmittance and reflectance of the mirror ($R+T=1$) and N is number of interfering rays which is usually a large number. δ is the phase difference between two consecutive waves. Write a script file that first prompts a user to specify N , A_0 , R and δ and compute the value of A_{Trans} .

(b) Explain following commands with suitable example [5]

(i) char (ii) flipud

(a) What will be OUTPUT in the command window?

[5]

- (i) $A = [2 \ 3 \ 4 \ 6; 1 \ 6 \ 7 \ 8; 9 \ 10 \ 11 \ 12]; \text{reshape}(A, 6, 2)$
- (ii) $\text{fix}([2.3 \ -5.6])$
- (iii) $A = [1 \ 2 \ 3; 4 \ 5 \ 6; 7 \ 8 \ 9]; x = A([1 \ 3], 1)$
- (iv) $'abc' > 'physics'$
- (v) $x = [0 \ 2 \ -2 \ 7]; y = [2 \ 3 \ -5 \ 7]; n = (x \leq y) \& (x > 2)$

(b) A cycloid is the curve described by a point P on the circumference of a circular wheel of radius r rolling along the x -axis. The curve is described in parametric form by the equations

$$x = r(\phi - \sin \phi)$$

$$y = r(1 - \cos \phi)$$

[5]

Use these equations to plot the cycloid for $r = 10$ inches and $0 \leq \phi \leq 4\pi$.

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THIRD SEMESTER

MID SEMESTER EXAMINATION

September

EP-203: MATHEMATICAL PHYSICS

Time: 1.5 Hours

Max. Marks: 25

Note : Answer any ALL questions.
Assume suitable missing data, if any.

1. If $a_{ij} x^i x^j = 0$, where a_{ij} is constant, then show that $a_{ij} + a_{ji} = 0$ (5)
2. Define the following along with one example: (2×3=6)
 - (a) Summation Convention
 - (b) Inner Product of two tensors
 - (c) Mixed Tensor of 5th rank tensor and its transformation law
3. Solve the equation $\frac{\partial^2 z}{\partial x^2} - 2 \frac{\partial z}{\partial x} + \frac{\partial z}{\partial y} = 0$ by the method of separation of variables. (6)
4. Prove that the solution of the Laplace's equation is $(C_1 \cos px + C_2 \sin px)$ $(C_3 e^{py} + C_4 e^{-py})$. Also solve by using this solution, which satisfies the condition $u(0, y) = u(l, y) = u(x, 0) = 0$ and $u(x, a) = \sin \frac{n\pi x}{l}$ (8)

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THIRD SEMESTER

MID SEMESTER EXAMINATION

Roll No. 201908
B.Tech(Engineering Physics).

EP 207 Digital Electronics
Time: 1:30 Hours

September-2017
Max. Marks: 30

Note: Answer all *four* questions.
Assume suitable missing data, if any.

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1. (a) Convert the following number 3
(i) $(472.321)_8 = (?)_2$ (ii) $(111011.011)_2 = (?)_{16}$
(iii) $(9E.AF2)_{16} = (?)$ (iv) $(36.532)_8 = (?)_{16}$
- (b) Simplify and design the logic circuit 3
(i) $(A + C)(AD + AD) + AC + C$
(ii) $A(A + B) + (B + AA)(A + B)$
2. (a) Simplify the Boolean function using K-Map
(i) $F(A,B,C,D) = \sum m(0,1,2,3,4,6,8,9,10,11,12,14)$ 2.5
(ii) $F(A,B,C,D) = \prod M(0,2,6,7,8,10,12,13)$ 2.5
- (b) (i) Design a logic circuit that has inputs A, B and C whose output is Y will be High only when a majority of the inputs are high. (ii) Design a logic circuit for detecting equality of two 2-bit binary numbers 4
3. (a) Design full adder using appropriate decoder 3.5
(b) Design Full subtractor using 3:8 DeMux. 4
4. (a) Inputs are (P_1, P_2) for both Latches using NAND and NOR gates first made $(0, 1)$ then after few seconds made it $(1, 1)$. Then Find the stable outputs Q and Q'. 3.5
(b) Design the Logic for S-R flip-flop write its Truth Table, Characteristics Table and Excitation Table. 4

FUNDAMENTALS OF MANAGEMENT

Time: 1hr.30min

Max. Marks :25

Q1. Identify the principles of management violated in the following cases and explain them.

- (i) A manager speaks to people at all levels, including his as well as other departments.
- (ii) A manager expects his subordinates to work for personal satisfaction and contentment, without any monetary rewards.
- (iii) A manager expects that his subordinate produces instant results, without giving him time to settle in the new environment.
- (iv) A manager is not serious with his employees regarding timings and targets completion

OR

Describe why it is important for managers to understand motivation. Describe briefly any 2 theories of Motivation & how can managers implement them in a corporate setting. (5 marks)

Q2. Paras Steel and general industries Ltd. decides to diversify its activities and now undertake production of both salt and automobiles. The chief executive seeks your advise for the most suitable organisation structure. What advise would you tender and why?

OR

"The principles of management can be distilled down to four critical functions. These functions are planning, organizing, leading, and controlling. This P-O-L-C framework provides useful guidance into what the ideal job of a manager should look like." Do you agree? Explain in brief with the help of a hypothetical example. (10 marks)

Q3. After years of falling revenues, in 1999-2000 Doordarshan (DD) had a revenue growth at 50%. In 1999-2000, DD earned revenues of 6.1mn compared to 3.99 mn in 1998-99. DD showed signs of revival with the launch of DD

... (a channel for NRIs) and had relative success with some of its regional channels. However, by the end of 2000-01, DD's honeymoon with success seemed to be over. In 2000-01, DD's revenues were projected to grow at 6-15% while private channels such as Zee TV, Star, Sony had projected 40-50% revenue growth. Analysts felt that DD's sagging revenues were only tip of the iceberg. DD was plagued by multiple problems, which found their roots in the mismanagement of affairs. By the late 1990's the private producers, advertisers and audience had deserted DD. Not even one car company advertised on DD and even two-wheeler manufacturers kept a low profile. Ads of Pepsi and Coca-Cola were found only during sports telecasts. Only FMCG companies stuck to DD because of its terrestrial network to reach the rural and semi-urban audience. In spite of having over 21,000 employees, DD outsourced 50% of its programmes from the private producers. In late 1990's DD faced number of allegations of large-scale scams and irregularities. Under utilized infrastructure, improper investments and poor financial management plagued the performance of DD. In 1992, when the Government opened airwaves to private players, DD faced the heat of competition from private satellite channels.

In the Cable & Satellite (C&S) homes it was found that there were hardly any viewers for the DD programmes. The depleting Television Viewer Ratings (TVRs) of the DD programmes was also a cause of concern as advertisers deserted due to its low viewer ratings. Analysts felt that DD would need a budgetary support of 5 bn during the fiscal 2000-01 to sustain itself as its revenues would not be enough to meet its expenditure.

Analysts questioned the capacity of the Government to own DD and many felt that privatization would be the only solution.

Questions

- a. In the light of the above caselet, how would you substantiate that success of a business enterprise is significantly influenced by its environment?
 - b. Do a SWOT analysis for DD and suggest suitable strategy to be adopted in future?
- (10 Marks)

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Roll No. D. 44

THIRD SEMESTER

B.Tech. [EP]

MID SEMESTER EXAMINATION

(September- 2017)

EP - 205

CLASSICAL & QUANTUM MECHANICS

Time: 1.5 Hours

Max. Marks : 25

Note : Answer **ALL** questions. Assume suitable missing data, if any.

1. a) Show that if Lagrangian function L does not contain time explicitly, then energy is conserved.
- b) An electrical circuit contains an inductance L and Capacitance C . Find the Lagrangian equation of motion when the charge of the capacitor is q and the current flowing through the circuit is i . (3+3)
2. a) If $[A, B]$ be the Poisson bracket, then prove that
$$\frac{\partial}{\partial t} [A, B] = \left[\frac{\partial A}{\partial t}, B \right] + \left[A, \frac{\partial B}{\partial t} \right]$$
- b) Write down the Hamiltonian and Hamilton's equation for a particle in potential $V(r)$ due to central force field in space. (3+3)
3. a) Calculate the commutation relation between momentum p_x and Hamiltonian H .
- b) State Ehrenfest theorem. Show that the average motion of the wave packet associated with a moving particle satisfies the equation
$$\frac{d}{dt} \langle x \rangle = \frac{\langle p_x \rangle}{m}$$
 (3+4)
4. a) Prove the orthogonal properties of energy eigen functions for one dimensional case.
- b) Calculate the probability of transmission of α particle through the rectangular barrier indicated below: $V_0 = 2$ eV, $E = 1$ eV and barrier width = 1 Å. (3+3)