THIRD SEMESTER B.TECH DEGREE EXAMINATION

(2013 Scheme)

13.301 ENGINEERING MATHEMATICS-II (ABCEFHMNPRSTU)

MODEL QUESTION PAPER

Time: 3 hours Maximum marks: 100

PART-A

*Answer **all** questions. **Each** question carries 4 marks*

1. A particle moves so that its position vector is given by

$\vec{r} = coswt\ \hat{\imath} + sinwt\ \hat{\jmath}$, show that the velocity $\overrightarrow{V}$ of the particle is perpendicular to $\vec{r}$.

2. If $f(x) = x\ ,\ o < x < \frac{\pi}{2}$

$= \pi - x\ ,\ \frac{\pi}{2} < x < \pi$. Show that $f(x) = \frac{4}{\pi}\ (sinx - \frac{sin3x}{3^2} + \frac{sin5x}{5^2} - \cdots)$

3. Find the cosine transform of $f(x) = sinx$ in $0 < x < \pi$.

4. Solve the partial differential equation if $\frac{\partial z}{\partial x} = 6x + 3y\ ; \frac{\partial z}{\partial y} = 3x - 4y$.

5. State the assumptions involved in the derivation of one dimensional Heat equation.

PART-B

*Answer **one full** question from **each** module. **Each** question carries **20** marks.*

MODULE-I

6. a) Find the constants a and b so that the surfaces $5x^2 - 2yz - 9x = 0$ and $ax^2y + bz^3 = 4$, may cut orthogonally at the point $(1, -1, 2)$.

b) If φ is a scalar point function, use Stoke's theorem to prove that $Curl(grad\ \varphi) = 0$.

c) Evaluate by Green's theorem in the plane for $\int_C\ (y - sinx)dx + cosx\ dy$ where C is the boundary of the triangle whose vertices are $(0,0), (\frac{\pi}{2}, 0)\ and\ (\frac{\pi}{2}, 1)$.

7. a) If $\vec{r} = x\ \hat{\imath} + y\ \hat{\jmath} + z\ \hat{k}$ prove that $\nabla r^n = nr^{n-2}\ \vec{r}$ where $r = |\vec{r}|$.

b) Show that $\vec{F} = e^x\left[(2y + 3z)\hat{\imath} + 2\hat{\jmath} + 3\hat{k}\right]$ is irrotational and find its scalar potential.

c) Using divergence theorem, evaluate $\iint_S\ F.n\hat{}\ ds$ where $\overrightarrow{F} = 4x\hat{\imath} - 2y^2\hat{\jmath} + z^2\hat{k}$ and S is the surface bounding $x^2 + y^2 = 4, z = 0$ and $z = 3$

MODULE-II

8. a) Obtain the Fourier series of the function $f(x) = \left(\frac{\pi - x}{2}\right)^2$ in $(0,2\pi)$

b) Find the Fourier transform of $f(x) = 1\ , |x| < a$

$= 0\ , |x| \geq a$

Hence evaluate $\int_0^\infty \frac{sinx}{x} dx$

9. a) Find the Fourier series of $f(x) = -x + 1\ , -\pi \leq x \leq 0$

$= x + 1\quad ,\quad 0 \leq x \leq \pi$

b) Find the Fourier cosine transform of $f(x) = e^{-4x}$ and

hence show that $\int_0^\infty \frac{cos2x}{x^2+16} dx = \frac{\pi}{8} e^{-8}$

MODULE-III

10. a) Solve the pde $pxy + pq + qy = yz$.

b) Solve the pde $(D^2 - DD' + 2D'^2)z = e^{3x+4y} + \sin(x - y)$

11. a) Solve the partial differential equation $x(y^2 - z^2)p - y(z^2 + x^2)q = z(x^2 + y^2)$

b) Solve the pde $(D^2 + DD' - 6D'^2)z = ycosx$

MODULE-IV

12. a) Using the method of separation of variables, solve $\frac{\partial u}{\partial x} - 2\frac{\partial u}{\partial t} = u$ given that

$u = 3e^{-5x} + 2e^{-3x}$ when $t = 0$.

b) A string of length l is fixed at both the ends. The midpoint of the string is taken to a height b and then released from rest in that position. Find the displacement of the string.

13. a) Solve $\frac{\partial u}{\partial t} = \alpha^2 \frac{\partial^2 u}{\partial x^2}$ subject to the condition, $u(0,t) = 0 = u(\pi,t)$ and

$u(x,0) = \pi x - x^2$ in $(0,\pi)$

b) A rod of length l has its ends A and B kept at 0^0C and 100^0C respectively until steady conditions prevail. The temperature at A is suddenly raised to 25^0C and at the same time that B is lowered to 75^0C and the end temperatures are thereafter maintained. Find the temperature function $U(x,t)$.

THIRD SEMESTER B.TECH DEGREE EXAMINATION

(2013Scheme)

13.302 HUMANITIES (BEFMRSU)

MODEL QUESTION PAPER

Time: 3Hours Max. Marks: 100

Instructions**: **Answer Part-I and Part-II in separate Answer Books.

PART-I (Economics)

Time: 2 hrs Max. Marks: 70

PART-A

*Answer **all** questions. Each question carries 2 marks.*

1. Distinguish between Producer good and consumer good.

2. Define production function.

3. Give an example of diminishing returns to scale.

4. Who is an entrepreneur?

5. Define the concept of Marginal Product.

6. What is meant by 'reserve requirement' by banks?

7. Name the methods of measuring National Income.

8. What is stagflation?

9. List out two reasons for Privatisation.

10. Define the concept of Poverty. (2 x10= 20 marks)

PART-B

*Answer any **one** full question from each Module. Each full question carries 25 Marks*

MODULE - I

11. What are the Central problems of an economy? Why do they arise? Do all economies have identical Central Problems?

OR

12. Explain the Law of variable proportion and Law of Returns to Scale.

MODULE - II

13. Explain the different concepts related to National Income calculation. Explain the sectoral distribution of National Income in India and what are the issues associated to it.

OR

14. a) Discuss the impact of multinational companies in Indian Economy.

b) Discuss the impact of globalization on Telecom and Financial sector.

PART-II (Accountancy)

Time: 1 hr Max. Marks: 30

*Answer any **two** questions. Each question carries 15 marks.*

1. Explain the concepts and conventions of accountancy.

2. (a) What are journal accounts? Explain the rules for journalizing.
(b) Briefly explain the accounting package.

3. Based on the following trial balance prepare a profit and loss account and a balance sheet.

The following is the trial balance of Mr. Alex as on 31st December, 2013.

	Dr (Rs)	Cr (Rs)
Plant and machinery	45,000	
Freehold premises	55,000	
Stock 1st January 2006	36,500	
Salaries	7,600	
Purchases	65,000	
Sales		1,21,000
Furniture and fitting	6,000	
Carriage inwards	1,675	
Carriage outwards	1,315	
Sales returns	2,400	
Purchases returns		1,365
Discount received		635
Discount allowed	430	
Wages	16,100	
Sundry debtors	41,000	
Sundry creditors		28,800
Alex's capital		1,10,000
Rent, rates and taxes	1,430	
Advertisement	2,400	
Cash in hand	450	
Cash at bank	2,500	
Drawings	3,000	
Loan from Rajesh		26,000
Total	2,87,800	2,87,800

THIRD SEMESTER BTECH DEGREE EXAMINATION 2014

(SCHEME: 2013)

Branch: Electrical and Electronics Engineering

13.303 NETWORKS AND SYSTEMS (E)

MODEL QUESTION PAPER

Time: 3 hours Maximum marks: 100

PART-A

*Answer **all** questions. **Each** question carries 2 marks*

1. Explain dot rule for coupled circuits.
2. Explain neutral displacement in 3ϕ, 3 wire system.
3. What are the drawbacks of K-derived filter.
4. Differentiate between low pass, high pass and band pass filter.
5. What is meant by poles and zeros of a network function.
6. Explain the design procedures of m-derived filter.
7. Explain how the knowledge of wave symmetry helps in simplifying the Fourier analysis.
8. Explain the properties of LC admittance function.
9. With the help of phasor diagram, obtain the relationship between phase and line voltages of a 3ϕ star connected load.
10. Define Image Impedance.

(10 x 2 Marks = 20 Marks)

PART-B

*Answer **one full** question from **each** module. **Each** question carries **20** marks.*

MODULE - I

11. (a) For the circuit in Fig.(1), find the current through 5Ω using Nodal method.

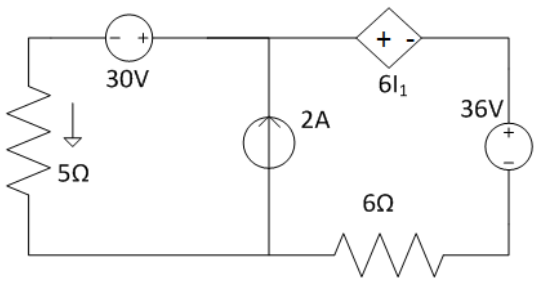

Fig. (1) (8 Marks)

(b) A 3 phase, 400V,RYB system supplies an unbalanced 3 wire, star connected load of $Z_R = (4+i8)\ \Omega$, $Z_Y = (3+j4)\Omega$, $Z_B = (15+i20)\ \Omega$. Find the line currents and neutral shift voltage. (12 Marks)

OR

12.(a) Find the voltage across the 5Ω resistor in Fig.(2).

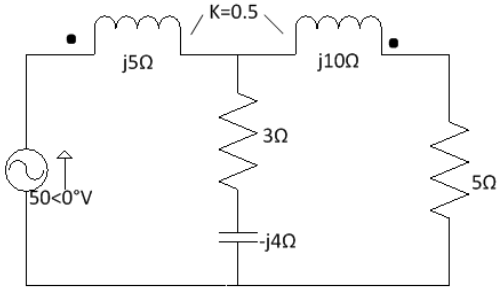

Fig.(2) (6 Marks)

(b) Find the Fourier series for the wave form in Fig.(3).

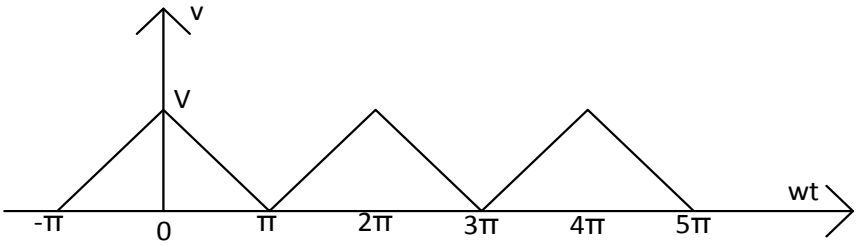

Fig. (3) (14 Marks)

MODULE - II

13. (a) Sketch the Pole Zero plots of Z_{11} and Z_{21} of the network shown in Fig. (4).

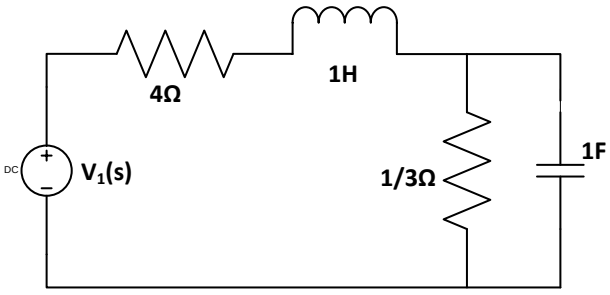

Fig. (4) (8 Marks)

(b) The inductor L_1 has an initial current of 1A and inductor L_2 has an initial current of 1A in the direction in Fig. (5). Determine the total response of $V_0(t)$ if $V_s(t) = 2u(t)$ V.

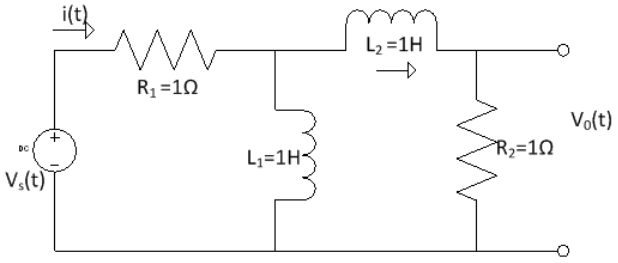

Fig. (5) (12 Marks)

OR

14. (a) Draw the linear oriented graph of the network shown in Fig. (6), and write the incidence matrix.

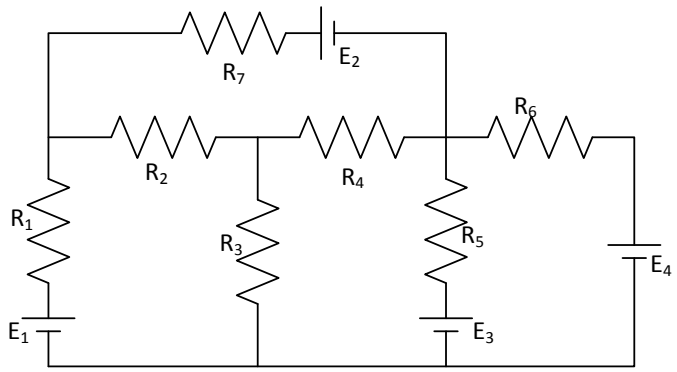

Fig. (6) (14 Marks)

(b) For the graph and the corresponding tree of the graph shown in Fig 7, find the f-cut set matrix.

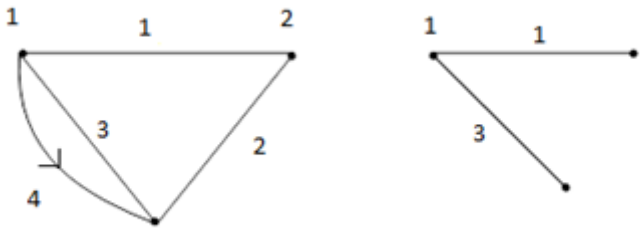

Fig. 7 (a) Fig. 7(b) (6Marks)

MODEULE - III

15. (a) Find Y parameters in terms of (i) ABCD parameters, (ii) h parameters. (8Marks)

(b) Find the admittance parameters of the given two port network in Fig. (8).

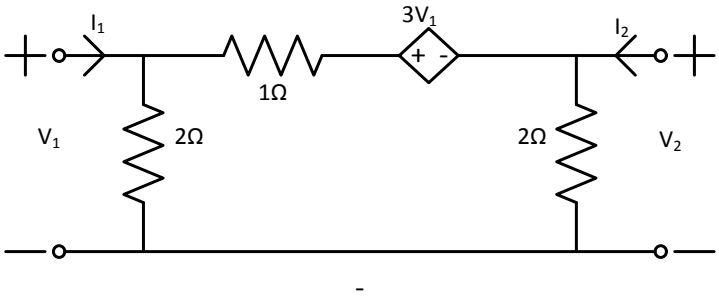

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Fig. (8) (12 Marks)

OR

16. (a) Design an m derived low pass filter having design resistance R = 500Ω, cut off frequency = 1500Hz and infinite attenuation frequency 2000Hz. (10 Marks)

(b) Design a constant k type high pass filter with T section, to be terminated in 600Ω resistance and cut off frequency 10Hz. Find the characteristic impedance and phase constant at 25kHz. (10 Marks)

MODULE - IV

17. (a) Synthesize the network function $Z(s) = \frac{s(s^2+4)}{2(s^2+1)(s^2+9)}$ as Foster I and Foster II forms. (14 Marks)

(b) Determine whether the following functions represent driving point impedance of an RC network.

$$Z_1(s) = \frac{(s^2+1)}{s^2+s+4}$$

$$Z_2(s) = \frac{s^2+3s+1.5}{4s^2+2s+2}$$ (6 Marks)

OR

18. (a)Find whether the following systems are linear or non linear.

(i) $y(t)=2\, d[x(t)]/dt$ (ii) $y(t) = \log[x(t)]$ (10 Marks)

(b) Define LTI system and

(i) verify whether the given system is linear and time invariant

$3\, dy(t)/dt + 5y(t) = x(t)$

(ii) Find whether the following systems are casual or non casual.

(a) $y(t) = x(t) + x(t-1)$, (b) $y(t) = x(t^2)$

(10 Marks)

THIRD SEMESTER BTECH DEGREE EXAMINATION 2014

(SCHEME: 2013)

Branch: Electrical and Electronics Engineering

13.304 ANALOG ELECTRONICS (E)

MODEL QUESTION PAPER

Time: 3 hours Maximum marks: 100

PART-A

*Answer **all** questions. **Each** question carries 2 marks*

1. Explain the term dc load line. Show how to locate it on the characteristics of a PNP transistor.
2. What are the factors that cause bias instability of a transistor amplifier?
3. Draw the h-parameter equivalent model of a transistor in CE configuration.
4. Define the following terms (i) I_{DSS} (ii) Pinch off voltage.
5. State Barkhausen criterion for sustained oscillation.
6. Explain cross over distortion in a class B amplifiers.
7. Explain the frequency response curve of RC coupled amplifier.
8. What is meant by CMRR?
9. Explain the frequency compensation of OP-AMP.
10. An OP-AMP has a slew rate of 1V/μ sec. Find the maximum frequency at which an undistorted sinusoidal output of 10V peak can be obtained.

(10 x 2 Marks = 20 Marks)

PART-B

*Answer **one full** question from **each** module. **Each** question carries **20** marks.*

MODULE - I

11. (a) In a silicon transistor design the different resistance values in a potential divider circuit with $\beta=50$, $V_{BE}=0.6V$, $V_{CC}=22.5V$ & $R_C=5.6k\Omega$. It is desired to establish the Q-point at $V_{CE}=12V$, $I_C=1.5mA$ & stability factor $S\leq3$. Also draw the designed circuit.

(12 marks)

(b) Explain the thermistor compensation in a transistor with a neat circuit. (8 marks)

12. (a)For a transistor connected in common emitter amplifier the h parameters are hie=1kΩ, hfe=50, hre=2.5μmho. If Rs=1kΩ & R_L=5kΩ. Calculate the current gain, voltage gain, input impedance & output impedance. (10 marks)

(b) Explain the graphical determination of h parameters of a common emitter amplifier. (10 marks)

MODULE - II

13. (a)Draw and explain a common source FET amplifier with voltage divider self bias circuit using a small signal low frequency equivalent circuit. Derive the expression for voltage gain of the FET amplifier. (15marks)

(b) Define FET parameters. (5marks)

14. (a) Draw and explain the construction, principle of working and characteristics of p-channel enhancement MOSFET. (10marks)

(b) Explain the working principle and characteristics of UJT. (10marks)

MODULE - III

15. (a)Explain the operation of class B amplifier. Obtain the expression for overall efficiency. Show that maximum overall efficiency of a class B amplifier is 78.5%. (12marks)

(b) Explain with a neat circuit diagram the working of series transistor voltage regulator. (8marks)

16. (a)With a neat circuit diagram explain the working of a Wien bridge oscillator. Derive the expression for frequency of oscillation and condition for oscillation. (12marks)

(b) Explain the effect of negative feedback on amplifier gain, bandwidth, nonlinear distortion and noise. (8marks)

MODULE - IV

17. (a) What are the characteristics of an ideal op-amp? With necessary diagrams, derive an expression for a practical inverting op-amp. (10marks)

(b) Draw the circuit of an emitter- coupled differential amplifier. Derive the expression for Ac, Ad and CMRR. (10marks)

18. (a)An op-amp is configured as non inverting summing amplifier. The input voltages are V_1=3V, V_2=1V & V_3=2V. The resistances on input side are R_1=R_2=R_3=1kΩ and the feedback resistance Rf=2kΩ. Determine the output voltage V_0. Assume that the op-amp is initially nulled. (10marks)

(b) Explain the following using op-amp with relevant waveforms

(i) triangular waveform generation

(ii) schmitt trigger. (10marks)

THIRD SEMESTER BTECH DEGREE EXAMINATION 2014

(SCHEME: 2013)

Branch: Electrical and Electronics Engineering

13.305 DC MACHINES & TRANSFORMERS (E)

MODEL QUESTION PAPER

Time: 3 hours Maximum marks: 100

PART-A

*Answer **all** questions. **Each** question carries 2 marks*

1. What are main parts of DC machine? Explain briefly their functions?
2. Distinguish between pole pitch and commutator pitch.
3. Explain briefly one method of improving commutation.
4. Deduce the expression for torque developed by a DC motor.
5. Explain briefly the Retardation test on DC motor.
6. Draw and explain the noload phasor diagram for a single phase transformer.
7. Outline the procedure for performing the polarity test on a single phase transformer.
8. In what way All Day efficiency of a transformer different from conventional efficiency.
9. What is the principle of autotransformer? Show the distribution of currents in the winding sections of a step up auto transformer.
10. Explain the working of ON load tapchanging trasformer with help of neat diagram.

(10 x 2 Marks = 20 Marks)

PART-B

*Answer **one full** question from **each** module. **Each** question carries **20** marks.*

MODULE - I

11. (a) Derive the emf equation of a DC generator. (5 marks)

    (b) What is the fuction of interpoles. (5 marks)

    (c) Draw the load characteristics of DC shunt and series generators and explain the shape mentioning their applications. (10 marks)

OR

12. (a) What is armature reaction in DC machines? What are its effects? Explain with relevant diagrams. (10 Marks)

(b) Two DC shunt generators operating in parallel supply a total load current of 200 A. The terminal voltage of one generator falls uniformly from 240 V to 225 V, when delivering 120 A. The terminal voltage of second generator falls uniformly from 230 V to 215 V delivering 100 A. Find the load current shared by each generator and bus bar voltage. (10 Marks)

MODULE - II

13. (a) How can the efficiency of a DC shunt motor be predetermined? Explain with circuit diagram and relevant calculations. Discuss the merits and demerits of this test. (10 Marks)

(b) The maximum current during starting for a 500 V DC shunt motor is to be limited to 125 A. The resistance of the armature is 0.25 ohm. Find the resistant elements for a 12 element starter. (10 marks)

OR

14. (a) Explain any three methods for speed control of DC motors. (10 Marks)

(b) Why DC series motors are preferred for Electric Traction? Explain with help of different characteristic curves. (5 Marks)

(c) How does a DC motor automatically adjust its input to match the mechanical load on the motor. (5 Marks)

MODULE - III

15. (a) Describe the open circuit and short circuit tests on single phase transformer. Explain how the equivalent circuit of such transformer can be obtained from test data. (10 Marks)

(b) The maximum efficiency of a 500 kVA, 3300/500V, 50Hz, single phase transformer is 97% and occurs at full load unity power factor. Find the efficiency of this transformer when its supplies $3/4^{th}$ full load at 0.8 p.f. (10 Marks)

OR

16. (a) Explain why parallel operation of transformers is necessary. (5 Marks)

(b) Explain why transformer rating is expressed in kVA. (5 Marks)

(c) Derive the condition for maximum efficiency of a single phase transformer. (5 Marks)

(d) Draw the phasor diagram of the transformer supplying leading p.f. load. (5 Marks)

MODULE - IV

17. (a) Describe the standard connections for three phase transformers. (10 Marks)

(b) Find the expressions for saving in copper in an auto transformer. (5 Marks)

(c) What are the necessary conditions for parallel operation of three phase transformers? (5 Marks)

OR

18. Write short notes on

(a) Three winding transformer. (7 Marks)

(b) Harmonics in transformers. (7 marks)

(c) Dry type transformers. (6 marks)

THIRD SEMESTER BTECH DEGREE EXAMINATION 2014

(SCHEME: 2013)

Branch: Electrical and Electronics Engineering

13.306 HYDRAULIC MACHINES AND HEAT ENGINES (E)

MODEL QUESTION PAPER

Time: 3 hours Maximum marks: 100

PART-A

*Answer **all** questions. **Each** question carries 2 marks*

1. Define the terms: Density, Specific weight, Specific volume and Specific gravity
2. Distinguish between Gauge, Absolute and Vacuum pressures.
3. Explain the significance of Reynolds number.
4. How hydraulic turbines are classified?
5. What is the significance of draft tube in a reaction turbine?
6. Explain the phenomenon of Cavitation.
7. What is the use of Air-vessel in reciprocating pumps?
8. Define the terms related to Internal Combustion engines Brake power, Indicated power, Thermal efficiency and Volumetric efficiency
9. Differentiate between SI and CI engines.
10. Explain Open cycle gas turbine and Closed cycle gas turbine with neat sketches.

(10 x 2 Marks = 20 Marks)

PART-B

*Answer **one full** question from **each** module. **Each** question carries **20** marks.*

MODULE - I

11. (a) State and prove Pascal's law (8 Marks)

(b) A U-tube manometer has been employed to measure the pressure of water in a pipe line which is in excess of at atmospheric pressure. The right limb of the manometer contains mercury and is open to atmosphere. The contact between the water and mercury is in the left limb. Determine the pressure of water in the pipe if the difference in level of mercury in the limbs of the U tube is 10cm and the free surface of mercury is in level with the centre of pipe. If the pressure of water in the pipe line reduces to $10kN/m^2$,

calculate the new difference in the level of mercury. Take specific weight of water as $10kN/m^3$. (12Marks)

OR

12. (a) Derive Bernoulli's equation. State the assumptions (8Marks)

(b) A horizontal venturimeter with inlet and throat diameters 300mm and 100mm respectively is used to measure the flow of water. The pressure at inlet is $120kN/m^2$ while the vacuum pressure head at the throat is 350mm of mercury. Assuming that 3% of differential head is lost in between the inlet and throat, find (i) Rate of flow and (ii) Coefficient of discharge for the venturimeter. (12Marks)

MODULE - II

13. (a) Explain Governing of a turbine. With a neat sketch explain the working of a centrifugal governor. (8 Marks)

(b) A single jet of Pelton wheel run at 350 rpm under a head of 510m. The jet diameter is 200mm. Its deflection inside the bucket is 165^0 and its relative velocity is reduced by 15% due to friction. Find (i) water power (ii) resultant force on the bucket (iii) brake power if mechanical losses are 3% of power supplied and (iv) overall efficiency. Assume suitable values for the velocity coefficient and speed ratio. (12 Marks)

OR

14. (a) Sketch the plant layout for a Hydraulic power plant and explain the significance of Surge tank. (8 Marks)

(b) The inner and outer diameter of an inward flow reaction turbine are 100cm and 80cm respectively and its breadth at inlet is 20cm. 10% of the flow area is blocked by the blade thickness. The flow velocity at inlet is 2.5m/s and runner speed is 300rpm. The guide vanes at the inlet make an angle of 12^0 to the wheel tangent. Assuming the discharge is radial and inlet and outlet flow velocity is same. Find out the following (a) Flow through the runner (b) Blade angles at inlet and outlet (c) Absolute and relative velocities of water entering the runner blade. (12 Marks)

MODULE - III

15. (a) Derive an expression for specific speed of a centrifugal pump. (8 Marks)

b) The inlet and outlet blade angles of the impeller of a centrifugal pump are 60^0 and 40^0 respectively. The width of the impeller is 30mm. The inlet and outlet diameters of the

impeller are 180mm and 600mm respectively. Find the speed of the pump to deliver 0.15 m^3/s of water. Flow at inlet is entirely radical. Find also the head generated by the impeller and the manometric head and the impeller power. The manometric efficiency or hydraulic efficiency of the pump is 85%. (12 Marks)

OR

16. (a) Explain with neat sketch working of a double acting reciprocating pump. (8 Marks)

(b) A single acting reciprocating pump has a bore of 75mm diameter and a stroke of 150mm. It draws water from sump whose water level is 3m below the pump axis, through a pipe 30mm in diameter and 4.25m in length. The pump delivers water to a tank through a 15m long pipe, 25mm in diameter to a height of 12m above the pump axis. If separation occurs at 2.5m (absolute), find the maximum speed of the pump. Take atmospheric pressure head 760mm of mercury. (12 Marks)

MODULE - IV

17. (a) Explain Morse test for IC engines. (8 Marks)

(b) A four cylinder, four stroke diesel engine, has a bore of 200mm and stroke of 300mm. At full load, at 720rpm, the BMEP is 5.93 bar and the specific fuel consumption is 0.226 kg/kWh. The air-fuel ratio as determined by exhaust gas analysis is 25:1. Calculate the brake thermal efficiency and volumetric efficiency of the engine. Atmospheric conditions are 1.01bar and 15^0C and calorific value of the fuel may be taken as 42000 kJ/kg. (12 Marks)

OR

18. (a) Discuss the effect of inter cooling on the performance of gas turbines. (8 Marks)

(b) In an open cycle constant pressure gas turbine air enters the compressor at 1.03bar and 27^0. The pressure of air after the compression is 4bar. The isentropic efficiencies of compressor and turbine are 80% and 85% respectively. The air fuel ratio use is 80:1. Find the thermal efficiency of the cycle, if the flow rate is 2.5kg/s. Take Cp = 1kJ/kgK and γ=1.4 for air and gases. Calorific value of fuel used = 42000kJ/kg. (12 Marks)

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