



ANJUMAN-I-ISLAM'S

AIKTC KALSEKAR TECHNICAL CAMPUS
INNOVATIVE TEACHING · EXUBERANT LEARNING

School of Architecture

School of Engineering & Technology

School of Pharmacy

Knowledge Resource & Relay Centre (KRRC)

AIKTC/KRRC/SoET/ACKN/QUES/2017-18/

Date: _____

School: SoET-CBSGS

Branch: CIVIL ENGG.

SEM: III

To,
Exam Controller,
AIKTC, New Panvel.

Dear Sir/Madam,

Received with thanks the following **Semester/Unit Test-I/Unit Test-II (Reg./ATKT)** question papers from your exam cell:

Sr. No.	Subject Name	Subject Code	Format		No. of Copies
			SC	HC	
1	Applied Mathematics- III	CE-C301		✓	02
2	Surveying- I	CE-C302		✓	02
3	Strength of materials	CE-C303		✓	02
4	Building materials and construction	CE-C304		✓	02
5	Engineering geology	CE-C305		✓	02
6	Fluid mechanics- I	CE-C306		✓	02

Note: SC – Softcopy, HC - Hardcopy

(Shaheen Ansari)
Librarian, AIKTC

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Q. P. Code: 25571

(3hours)

[Total marks: 80]

- N.B.** 1) Question No. 1 is compulsory.
 2) Answer **any Three** from remaining
 3) Figures to the right indicate full marks

1. a) Verify Laplace equation for $u = \left(r + \frac{a^2}{r}\right) \cos \theta$. 5

b) Find Laplace transform of $f(t) = e^{-3t} \sin 2t \cdot \cos 3t$. 5

c) Obtain Fourier series for $f(x) = x$ in $(-\pi, \pi)$. 5

d) Evaluate $\int_C (z^2 + 3z^{-4}) dz$ where C is the upper half of the unit circle from (1,0) to (-1,0). 5

2. a) Obtain the Taylor's and Laurent series which represent the function $f(z) = \frac{z}{(z+1)(z-2)}$ in the regions, i) $|z| < 1$ ii) $1 < |z| < 2$ 6

b) Obtain Complex form of Fourier series for $f(x) = \cos hx$ in $(-\pi, \pi)$ 6

c) Using Laplace transform, solve the differential equation:
 $\frac{dx}{dt} + 2x = \sin \omega t$, with $x(0) = 1$. 8

3. a) Solve $\frac{\partial^2 u}{\partial x^2} - 100 \frac{\partial u}{\partial t} = 0$ with $u(0, t) = 0, u(1, t) = 0, u(x, 0) = x(1 - x)$ taking $h = 0.1$ for three time steps up to $t = 1.5$ by Bender - Schmidt method. 8

b) Find the bilinear transformation which maps the points $z = 1, i, -1$ into the points $w = 0, 1, \infty$. 6

c) Obtain half range Fourier sine series for $f(x) = \begin{cases} x, & 0 < x \leq \pi/2 \\ \pi - x, & \pi/2 \leq x < \pi \end{cases}$ 8

Hence, prove that -

$$\frac{\pi^4}{96} = \frac{1}{1^4} + \frac{1}{3^4} + \frac{1}{5^4} + \dots$$

[TURN OVER]

Q. P. Code: 25571

4. a) Find the orthogonal trajectory of the family of curves $2x - x^3 + 3xy^2 = c$ 6
 b) Find the Fourier series for $f(x) = x|x|$ in $(-1, 1)$. 6

c) Find the inverse Laplace transform of:-

i) $F(s) = \frac{1}{s(s^2+16)}$, using Convolution theorem, ii) $F(s) = \cot^{-1}(s+1)$. 8

5. a) Solve by Crank –Nicholson simplified formula $\frac{\partial^2 u}{\partial x^2} - \frac{\partial u}{\partial t} = 0$,

$u(0, t) = 0$, $u(5, t) = 100$, $u(x, 0) = 20$ taking $h = 1$ for one-time step. 6

- b) Find the image of the circle $|z| = 4$ in the z -plane under the transformation $w = z + 4 + 3i$. Draw the sketch. 6

c) Find the analytic function $f(z) = u + iv$ if

$$u - v = \frac{\cos x + \sin x - e^{-y}}{2 \cos x - e^y - e^{-y}}$$

when $f\left(\frac{\pi}{2}\right) = 0$. 8

6. a) Using Residue theorem, evaluate, $\int_0^{2\pi} \frac{d\theta}{5 - 3\cos \theta}$ 6

- b) Using Laplace transform, evaluate $\int_0^{\infty} e^{-t}(1 + 3t + t^2)H(t - 2)dt$ 6

- c) A tightly stretched string with fixed end points $x = 0$ and $x = l$, in the shape defined by $y = kx(l - x)$ where k is a constant is released from this position of rest. Find $y(x, t)$, the vertical displacement if $\frac{\partial^2 y}{\partial t^2} = c^2 \frac{\partial^2 y}{\partial x^2}$. 8

2

(3 hours)

[Total marks-80]

N.B. (1) Question No.1 is compulsory.

(2) Attempt any three questions out of the remaining five questions.

(3) Assume any suitable data if required, state clearly the same.

(4) Figures to the right indicate full marks.

(5) Attempt sub questions in order.

1. Write short notes on any four (5x4=20)

(i). Volume calculation by spot levels.

(ii). Applications of contour maps.

(iii). Principle of surveying.

(iv). Traverse balancing rules.

(v). Local attraction and its elimination

2.a. The following bearings were taken for a closed compass traverse :

Line	AB	BC	CD	DE	EA
FB	191°30'	69°30'	32°15'	262°45'	230°15'
B B	13°0'	246°30'	210°30'	80°45'	53°0'

(i). Determine the correct magnetic bearings. (07)

(ii). Calculate the true bearings, if the declination was 1°30' E. (02)

(iii). Tabulate the correct magnetic bearings and true bearings. (01)

2.b. Compare well conditioned and ill conditioned triangle. (04)

2.c. Describe various tape corrections applied to obtain true length. (06)

3.a. Calculate the length and bearing of line EA for a closed traverse from following data: (10)

Line	AB	BC	CD	DE	EA
Length in m	217.5	318	375	283.5
Bearing	120° 15'	62° 30'	322° 24'	235° 18'

3.b. Define Surveying. Write detailed note on classification of surveying. (10)

4.a. The following readings have been taken from a page of an old level book. It is required to reconstruct the page. Fill up the missing quantities showing the calculation & apply the usual checks. (10)

STATION	B.S	I.S	F.S	RISE	FALL	RL	REMARKS
1	3.125					?	BM
2	?		?	1.325		125.505	TP
3		2.32			0.055	?	
4		?		?		125.585	
5	?		2.655		?	?	TP
6	1.62		3.205		2.165	?	TP
7		3.625			?	?	
8			?			123.090	TBM

4.b. The circle of a theodolite is divided into degree and $\frac{1}{4}$ of degree. Design a suitable decimal vernier to read up to 0.005° . (04)

4.c. Define following: (06)

- 1) Changing the face & Transiting
- 2) Reduced level & Line of collimation
- 3) Isogonic lines & Agonic lines

5.a. Describe in detail procedure of horizontal angle measurement by reiteration method (08)

5.b. Explain various methods of plane table surveying stating suitability of each. (12)

6. Write short notes on following: (5x4=20)

- a. Reciprocal leveling.
- b. Sensitiveness of Level Tube
- c. Area by D M D.
- d. Difficulties in leveling.

12

Paper / Subject Code: 49203 / STRENGTH OF MATERIALS

Q.P.Code: 27318

(3 Hours)

Total Marks :80

- 1) Question no.1 is compulsory
- 2) Attempt any three question from remaining five
- 3) Assume any suitable data if required

Q1 a) Derive the relationship between rate of loading(W), shear force (SF) and bending moment(BM). (20)

b) What are the assumptions of theory of pure bending

c) A 230mm x 350 mm simply supported beam carries a UDL of 20kN/m over a span of 8M. Determine the maximum shear stress at a section 2m from the support.

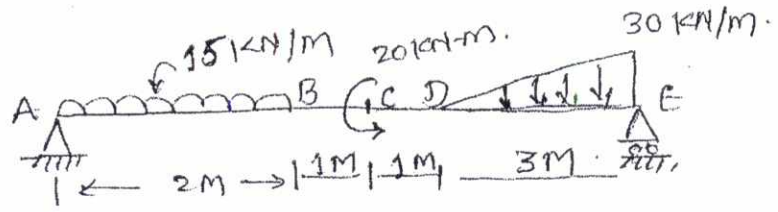
d) A rectangular column of 230mm x 350mm and 4M long used as a column. If one end is hinged and other is fixed, find the safe load the column can carry if FOS=2.5. use Euler's formula. Take E= 210kN/mm²

e) Determine the area of core section for rectangular section of size 230mm x 350mm.

Q.2 a) A 300mm x 400mm RCC column provided with 6 bars of 16mm diameter subjected to compressive load of 800kN. Find the corresponding stress produced in steel and concrete. Take Es= 210kN/mm² Ec= 35kN/mm²

B) A circular rod ABC is subjected to axial compressive load of 50kN. The part AB is hollow circular (04) With outer diameter of 25mm and inner diameter of 10mm and length of 200mm. The part BC is solid circular with diameter of 25mm and length of 300mm. Calculate total decrease in length of the bar. Take E= 210kN/mm²

c) Draw the shear force and bending moment diagram for the beam loaded as shown in fig. (10)



Q3 a) A hollow circular column of 2.8m long is fixed at one end and hinged at other end, has to support a load of 500kN The internal diameter is 0.8 times external diameter. Calculate the external diameter with FOS=4. Take $\sigma_c=330 \text{ N/mm}^2$ $\alpha=1/7500$ (06)

b) A I beam having web 20mm x 100mm , top flange 120mm x 20mm, bottom flange 80mm x 10mm (7) has a span of 5m and is simply supported at ends. Find the maximum load the beam can carry if the compressive and tensile stress not to exceed 60kN/mm² and 75kN/mm²

Turn Over

- Q3 c) A flitched beam consist of wooden joist 150mm wide and 300mm deep strengthen by steel plate of 10 mm thick at bottom. Find the moment of resistance by using transformed area concept. permissible stress in wooden joist is 8N/mm^2 . Take $E_s = 15E_w$ (07)
- Q4 a) A beam of square section of size 200mm x 200mm is placed with one of it's diagonal horizontal and it carries a shear force of 80kN. Draw the shear stress distribution diagram. (08)
- b) A cylindrical shell is 3m long and 1.2m in diameter and 12mm thick is subjected to internal pressure of 1.8N/mm^2 calculate change in dimension of shell. Take $E = 210\text{kN/mm}^2$ $1/m = 0.3$ (06)
- c) A rod of 300mm long and 20mm in diameter is heated through 100°C and at the same time pulled by force P. If the total elongation is 0.4mm. What is the magnitude of P. Take $E = 210\text{kN/mm}^2$ and $\alpha = 12 \times 10^{-6}$ (06)
- Q.5 a) At a point in a strained material the stresses on two mutually perpendicular plane are 120kN/mm^2 and 80kN/mm^2 both are tensile. Find the normal, tangential and resultant stress at a plane inclined 30° to the major principal plane. (08)
- b) A hollow circular steel shaft of 5m length has to transmit 150KW power at 120rpm. If internal diameter is 0.6 times external diameter , total angle of twist not to exceed 3° and shear stress is limited to 50N/mm^2 . Determine the diameter of shaft. Take $G = 84\text{kN/mm}^2$ (08)
- c) Draw a shear stress distribution diagram for hollow rectangular section when it is subjected to pure bending and torsion. (04)
- Q6a) In the rectangular section 400mm wide and 300mm deep is subjected to compressive load of 80kN at an eccentricity of 40mm and 75 mm from centroidal xx and yy axis. Find stress at each corner. (08)
- b) A unknown weight falls through 15mm on a collar rigidly attached to the lower end of the bar (06)
- 4M long and 800mm^2 in area. If the maximum instantaneous elongation is 3mm, find the corresponding Stress and the value of unknown weight. Take $E = 210\text{kN/mm}^2$
- c) A solid circular rod of 10mm diameter and length 300mm when subjected to tensile load of 20kN show the increased in length of 5mm and decrease in diameter by 0.006mm. Calculate E, G and K. (06)

80 Marks

3Hours

- N. B. 1. Question no. 1 **compulsory**.
 2. Answer any three questions out of remaining
 3. Assume any data, if required and state them clearly
 4. Attempt sub questions in order
 5. Illustrate answer with neat sketches wherever required
 6. Figures to the right indicate full marks.

- | | | |
|----|---|------|
| 1. | Explain with sketches (any four questions) | |
| a | Combine footing | [5M] |
| b | King closer, queen closer and bevelled closer | [5M] |
| c | Putlog Scaffolding | [5M] |
| d | Stone finishes (any three) | [5M] |
| e | Load Bearing Structure | [5M] |
| 2. | Differentiate between | [8M] |
| a | i) Plastering and Painting | |
| | ii) Damp proofing and water proofing | |
| b | Explain jack arch floors? | [6M] |
| c | Mention the experiments performed in laboratory on tiles and cement? Explain field test performed on brick to check the quality of brick at site. | [6M] |
| 3. | What is form-work? Explain the advantages of steel formwork over timber formwork? | [4M] |
| a | Sketch the cross-sections and elevations of: | [8M] |
| b | (i) $2^{1/2}$ Single Flemish bond | |
| | (ii) Random Rubble Masonry. | |
| c | What do you mean by seasoning of timber? Explain the defects in timber caused due to external natural forces with neat sketches? | [8M] |
| 4. | List out the various types of glasses and state their uses in construction? | [8M] |
| a | Explain briefly manufacturing process of brick? | [6M] |
| b | Sketch the cross-section of Queen post roof truss and name the various members in it? | [6M] |
| c | | |
| 5. | Explain the properties of hydraulic lime? | [4M] |
| a | What is Plaster of Paris? Explain the properties of Plaster of Paris. | [4M] |
| b | Explain the use of aluminium and steel as construction materials. | [6M] |
| c | Enumerate the methods of preservation of timber and explain the method of preservation of stones? | [6M] |
| d | | |
| 6. | Define sound insulation. What is the unit of measurement of sound? Explain acoustical defects. | [8M] |
| a | Write short notes on: | [12] |
| b | (i) Plastering | |
| | (ii) Ventilation | |
| | (iii) Flooring materials. | |



B. E - sem - II - (BSGS - Civi)

(3 Hours)

(Total marks: 80)

NB: (1) question No 1 is compulsory

(2) Attempt any three questions from remaining five questions

(3) Figures to the right indicates full marks

(4) Draw neat sketches wherever necessary

- | | | | |
|---|-------|--|----|
| 1 | (a) | Name the following mineral with the help of given properties | 5 |
| | (i) | Fine grained (aphanitic texture) igneous rock, black or greyish green with conchoidal fracture | |
| | (ii) | Metamorphic rock with siliceous composition formed by the metamorphism of sandstone | |
| | (iii) | Clastic sedimentary rock with rounded pebbles held together by cementing matrix | |
| | (iv) | Mineral most resistant to the weathering, absence of cleavage, vitreous lusture | |
| | (v) | Extremely soft mineral, ability to absorb oil and grease, foliated form, hardness one | |
| | (b) | Explain following with diagram | 10 |
| | (i) | Delta | |
| | (ii) | Pedestal rocks | |
| | (iii) | Barchan Dunes | |
| | (iv) | Crag and tail | |
| | (v) | River meandering | |
| | (c) | Differentiate between following | 5 |
| | (i) | Similar and parallel fold | |
| | (ii) | Conglomerate and breccias | |
| | (iii) | Sill and dyke | |
| | (iv) | Vesicular basalt and amygdaloidal basalt | |
| | (v) | Dip and strike | |
| 2 | (a) | Describe erosional and depositional features created by geological action of wind. | 10 |
| | (b) | Write classification of Igneous rocks on the basis of mineral constituents and texture. | 6 |
| | (c) | Explain internal structure of earth revealed by seismic waves. | 4 |
| 3 | (a) | Describe classification of fold on the basis of position of axial plane | 6 |
| | (b) | How rocks are get faulted? Describe various parts and fault. | 8 |
| | (c) | Explain structure and economic importance of Deccan traps | 6 |

- 4 (a) What are the forces acting on a dam? Describe lithological and structural consideration for site selection of dam. 10
- (b) With the help of diagrams explain role of geology in the successful tunnelling. 10
- 5 (a) Describe seismic reflection method of subsurface investigation. 5
- (b) Explain the characteristic properties of good building stones with suitable examples. 5
- (c) What is the difference between confined and unconfined aquifer? Explain various geological factors which influence the movement of ground water. 10
- 6 Write short notes on (any five) (04x5)
- (i) Laws of stratigraphy
 - (ii) Types of metamorphism
 - (iii) Texture of sedimentary rocks
 - (iv) Unconformity
 - (v) Seismic division of India.
 - (vi) Types of volcanism
 - (vii) Earthquake zones of India
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Paper / Subject Code: 49206 / FLUID MECHANICS-I

(3 hours)

Q. P. Code: 16696

Note:

Max.Marks: 80

Question no.1 is compulsory

Solve any 3 questions out of remaining

Assume data wherever necessary and clearly mention the assumptions made.

Draw neat figures as required.

Q 1 Answer any 4 of the following.

20

4 X 5

- a Write a short note on properties of fluids.
- b Calculate the capillary effect in millimeters in a glass tube of 4 mm diameter, when immersed in (i) water and (ii) mercury. The temperature of the liquid is 20°C and the values of surface tension of water and mercury at 20°C in contact with air are 0.0735 N/m and 0.51 N/m respectively. The contact angle for water $\theta = 0^{\circ}$ and for mercury $\theta = 130^{\circ}$. Take specific weight of water at 20°C as equal to 9790 N/m^3 .
- c Enlist the advantages and limitations of Manometers.
- d Define the terms (i) Total pressure (ii) Center of pressure (iii) Metacenter (iv) Metacentric height (v) Buoyancy
- e Differentiate between the Eulerian and Lagrangian methods of representing fluid flow.
- f List the assumptions and limitations of Bernoulli's equation.
- g What is a Notch? How are the Notches classified?

Q 2 a Two large fixed parallel planes are 12 mm apart. The space between the surfaces is filled with oil of viscosity 0.972 N.s/m^2 . A flat thin plate 0.25 m^2 area moves through the oil at a velocity of 0.3 m/s . Calculate the drag force:

10

- (i) When the plate is equidistant from both the planes, and
- (ii) When the thin plate is at a distance of 4 mm from one of the plane surfaces.

b On the suction side of a pump a gauge shows a negative pressure of 0.35 bar. Express this pressure in terms of :

10

- (i) Intensity of pressure, kPa,
- (ii) N/m^2 absolute,
- (iii) Meters of water gauge,
- (iv) Meters of oil (specific gravity 0.82) absolute, and
- (v) Centimeters of mercury gauge

Take atmospheric pressure as 76 cm of Hg and Relative density of mercury as 13.6

- Q 3 a A solid cylinder 10 cm diameter and 40 cm long is made of two materials. The bottom 1 cm is of material of specific gravity 6.5 and the portion above of specific gravity 0.6. Does the cylinder float vertically in water of mass density 1000 kg/m^3 ? 10
- b In a fluid, the velocity field is given by $V = (3x+2y) i + (2z+3x^2) j + (2t-3z) k$ Determine: 10
 (i) The velocity components u, v, w at any point in the flow field;
 (ii) The speed at point $(1,1,1)$;
 (iii) The speed at time $t=2s$ at point $(0,0,2)$
 Also classify the velocity field as steady, or unsteady, uniform or non uniform and one,two or three dimensional
- Q 4 a Determine the rate of flow of water through a pipe of 300 mm diameter placed in an inclined position where a venturimeter is inserted, having a throat diameter of 150 mm. The difference of pressure between the main and throat is measured by a liquid of sp. Gravity 0.7 in an inverted U-tube which gives a reading of 260 mm. The loss of head between the main and throat is 0.3 times the kinetic head of the pipe 10
- b A tank containing water up to a depth of 500 mm is moving vertically upward with a constant acceleration of 2.45 m/s^2 . Find the force exerted by water on the side of the tank. Also calculate the force on the side of the tank when the width of the tank is 2 m and 10
 (i) Tank is moving vertically downward with constant acceleration of 2.45 m/s^2
 (ii) Tank is not moving at all.
- Q5 a A tank containing water is provided with a sharp edged circular orifice of 7.5 mm diameter. The height of water in the tank is 1.44 m above the orifice. The jet strikes a wall 1.5 m away and 0.42 m vertically below the centerline of the contracted section of the jet. The actual discharge through the orifice is measured to be 35 liters in 4 minutes. Determine: 10
 (i) The orifice coefficients (ii) The power loss at the orifice
- b Derive an equation for discharge over a Rectangular and Triangular Notch. 10
- Q6 Answer the following questions 4 X 5
- a Derive the equation for discharge through fully submerged orifice.
 b What are the advantages of Triangular notch over a Rectangular notch
 c Explain experimental determination of Hydraulic Coefficients
 d Derive equation for discharge over broad crested weir.

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