

**SUKATAN PEPERIKSAAN SUBJEK JABATAN PBT  
BAGI PENOLONG JURUTERA (AWAM) GRED JA29**

**SUBJEK : KEJURUTERAAN AWAM**

**KOD : ENG200SAH(PBT)**

**Tujuan Peperiksaan** Untuk memenuhi salah satu syarat bagi pengesahan dalam jawatan bagi Penolong Jurutera (Awam), Gred JA29 yang masih dalam tempoh percubaan.

**Pegawai yang layak menduduki peperiksaan ini** Penolong Jurutera (Awam), Gred JA29 yang **belum** disahkan dalam perkhidmatan.

**Objektif Peperiksaan** Untuk menguji kebolehan pegawai dari segi:

1. Pengetahuan dan kefahaman dalam prinsip-prinsip asas Kejuruteraan Awam
2. Pengaplikasian konsep / prinsip / prosedur berkaitan dengan kejuruteraan awam

**Sukatan Peperiksaan** **Estimating & Contract Administration**

Scope of subject, main principles, taking of and working up, group method of taking off, various items in a building estimate. Detailing materials and labour, setting up and pricing. Standard method of estimating, reinforced concrete work, steelwork, general engineering services. Approximate estimates, estimates for repair work. Preparation of estimate for a small engineering structure from drawing and specifications.

General conditions of contract, types of contract, contract management (contractual documentation, tender procedures, contract payment, site meeting & reporting, variation order, extension of time, etc.) Local Authority Financial Regulations (1997).

**Surveying & site investigation**

Chain survey - general Principles - Use and adjustments of instruments - clearing obstructions - Plotting - Calculation of areas - Planimeter. Compass survey - Prismatic Compass - Use and adjustments - Magnetic variation - Survey with and without chain.

The Telescope - Principles - Refraction and Curvature – Reciprocal leveling.

Leveling - Forms of field book - Types of levels - Use and adjustments. The leveling staff - Fly levels. Spot levels - Longitudinal and cross section leveling - Contouring -

Computation of earthwork and capacity of reservoirs by cross section leveling and contour lines - Setting out. Use of sight rails and boning rods.

Theodolite: Elementary introduction to the use of Theodolite

Site Investigation - Objectives, stages, scope and planning of geotechnical investigation. Investigation methods and procedures

## **Reinforced Concrete**

General: Importance of design and construction, construction equipment.

Materials: Properties, coarse aggregate, gauging and grading fine aggregate, grading, cement properties, rapid hardening and high alumina, cement, supply and storage - water.

Reinforcement - Size and length of bars, method of supply cutting, bar vending, bending dimensions, bending operations, assembling bars, wire ties, concrete cover and bar spacing, cost of reinforcement, supplying bending and fixing.

Site tests: Determination of grading of aggregate, voids test porosity, wetness, organic impurities loam, bulking of sand, screen and washing aggregate.

Shuttering - Principles, construction of shuttering design, erection and removal.

Concrete Proportions - method of specifying proportions, measurement of materials water ratio, workability, compacting factor and slump - Mixing concrete, hand and machine mixing, transporting and general principles - consolidation - use of vibrators - curing and protection of concrete. Strength of concrete, factors affecting concrete strength - specified strengths, work test cubes. Organisation of simple R.C. construction jobs.

Principles R.C. design - with particular reference to correct placing of reinforcement. Interpretation of R.C. details form plans.

## **Building Construction**

### **Materials**

Lime, cement, mortar and plaster. Properties of lime - burning slaking, and mortar mixing - R.S.S. for cement - practical tests for lime and cement - Plastering, pointing, white and colour washing.

Bricks: Classification, good bricks, strength and weight of bricks characteristics of good bricks and tiles - roofing and flooring tiles.

Timber: Classification of local timber - Properties and uses of important local timbers used in building work, seasoning of timber, defects in timber, decay and preservation of timber.

Iron and Steel: Properties and uses of C.I., W.I. and steel in buildings.

Paints, Distempers and Varnishes - Ingredients of paints, mixing paint, wood oil, coal tar, distemper, and varnish.

Miscellaneous: Non-ferrous metals used in building - asbestos, bitumen, earthenware and glass.

### Construction

Foundations: Preparation of soil, drainage of building site, excavation, strengthening foundations, piles and pile driving - including recording and taking set and load testing of piles. Pressure on soil under foundations and testing concrete foundation. Setting out building.

Walling - Thickness of walls, enclosing and panel walls, brick wall, bond, footings, openings in walls, jambs and cills, arches and lintels, wall covering framed structures, reinforced concrete panel walls, hollow block walls - damp proofing.

Floors: Basement floor, ground floor, upper floors steel, timber and concrete floors. Floor finishing, granolithic, terrazzo, wood block, rubber and cork. Floor boarding.

Roof: Roof construction, the roof truss, flat roofs, pitched roofs, caves, roof coverings, insulation and waterproofing systems.

Carpentry and joinery - Temporary and permanent carpentry, longitudinal and transverse joints - Timber trenches - Formwork for concrete work, centering - shorting and scaffolding. Timber floors and partitions - Timber roofs - Trusses, rafters, purlins and battens and battens, doors, window and ventilators.

Wall finishes - Plastering - wooden wall covering, stone marble tiles, artificial stones, terrazzo, etc. Wallboards and acoustical materials.

Sanitary works and water fitting including installation of water closets, and other soil fittings, jointing and fixing of

down pipes, laying of sewage pipes, construction of imheff tanks, etc.

## **Water Supply, Sanitary & Sewerage**

### Water Supply

- (i) Pipe work materials and Fittings  
Types of materials for pipes, joints and specials in water supply application, uses and selection. Valves and hydrants in water supply use and their location, layout of water supply distribution system.
- (ii) Pipe laying  
Excavation, dewatering, laying, jointing, testing and inspecting of pipelines and back filling. Special pipe crossing for rivers, roads, culverts and bridges, chambers, thrust block and anchor blocks.
- (iii) Private Supplies  
Water supply rules. Water supply plumbing materials and fittings. Internals plumbing for simple dwelling house, service connection to JKR mains.

### Sanitary and Sewerage

- (i) Pipe work materials and fittings  
Types of materials for pipes. Joints and specials in sewerage work application. Use and selection. Methods of bedding.
- (ii) Sewer Appurtenances  
Manhole. Inspection chamber. Grease and oil traps junctions. Sewer crossings. Inverted Siphons.
- (iii) Private Drain Line  
Sanitary by-Laws, sanitary plumbing materials and fittings. Internal plumbing for simple dwelling house and high-rise building. House connection.
- (iv) Sewer Construction  
Lines and grades excavation, sheeting and bracing, removal of sheeting and bracing. Dewatering of trenches. Pipe laying. Jointing. Jacking and boring. Backfilling. Tunneling. Testing and Inspection of sewer lines.
- (v) Pumping of Sewage  
Need for pumping. Pumps for sewage. Pumping Stations. Sump Pumps.
- (vi) Maintenance of Sewers  
Regulation/ordinance. Sewer cleaning. Inspection practice. Making repairs and connections. Gases in sewers.

- (vii) Characteristics of Sewage  
Physical characteristics. Chemical characteristics.  
Anaerobic processes. Aerobic processes.  
Biochemical Oxygen Demand (BOD).
- (viii) Treatment Works  
Septic Tanks, Imhoff Tanks, Activated Sludge  
Systems, Preliminary Treatment. Oxidation Ponds.

## **Urban Transport**

Introduction - Road engineering terms, elementary study of soil, alignment and soil survey, supporting power of sub grade, sub grade treatment.

Alignment - General requirements, direction, influence of topography reconnaissance, modern alignment - curves, gradients and super elevation, provision of transition in present day road curves, crossings and junctions.

Preparation of Scheme - Preliminary survey, land acquisition, location survey, preparation of working drawings and estimates.

Construction - Construction survey, setting out profile, bulk age, shrinkage and settlement, clearing earthwork operation, hand and mechanical excavation, transporting earth and construction of embankments, sets out road profile, pavement construction, field and laboratory controls.

Road basis and surfacing - various types of road basis, choice of type, various types of surfacing, desirable properties, water bound and bituminous surfacing. Bitumen and bituminous treatment of road surfaces, carriageway suitable for various sub grade and traffic conditions, use of plant for road basis and surfacing, standard tests for bitumen and mixes.

Drainage - Introduction subsoil drainage and surface water drainage ground water, capillary water, provision of sub drainage, local investigations, drainage of water, capillary water, springs and seepages, drainage of embankments, subsoil water outlets, disposal of surface water, drainage structures.

Retaining Walls - Objects, forms of construction, foundations, thickness of walls, drainage and backfill, cause of failure repairs.

Culverts - Construction of various types of culverts.

Bridges - Construction of timber bridges and simple steel

and concrete bridges on masa concrete abutments.

Quarries - Occurrence of stone, choosing a quarry site, types, layout and development of quarries, drilling, hand and pneumatic, pneumatic equipment, crushing, screening and transport of stone, quarry rules.

Maintenance - General maintenance work, preparation work, preparation of maintenance programme, inspection report on bridges and culverts, preparation of various maintenance returns.

Costing - Costing in detail of various items:

- In road maintenance work such as grass cutting, clearing drains, painting, repairs to bridges, patching, jungle clearing, etc. including rolling transport and supervision.
- In resurfacing and sealing and working out average maintenance cost per mile, etc.

Traffic signs and control -traffic signs, signals, intersections, road markers, road line marking.

Traffic Survey -field study (vehicle count, turning movements and road side interviews). Origin and destination survey.

Traffic Engineering and Highway safety features and installation, development and access control.

Public Transport.

**Soalan**

1. Bahagian A: 40 soalan aneka pilihan. Jawab kesemuanya.
2. Bahagian B: 3 soalan esei dari Seksyen I. Jawab mana-mana 2 soalan. 2 soalan esei dari Seksyen II. Jawab 1 soalan sahaja.

**Bahasa**

1. Soalan Bahasa Melayu.
2. Jawapan Bahasa Melayu atau Bahasa Inggeris

**Masa  
Tahap Kesukaran  
Soalan**

2½ jam  
Aras I Pengetahuan  
II Kefahaman  
III Aplikasi

|   |  |
|---|--|
| <b>Rujukan</b>                              | <p>General Conditions Of Contract, PWD 75 (Rev. 5/61)<br/> Local Authority Financial Regulations (1997).<br/> Arahan Teknik JKR<br/> Calon dibenarkan membawa dokumen berikut ke dalam dewan peperiksaan:</p> <ul style="list-style-type: none"> <li>• <i>BS8110 Structural Use of Concrete Part 1: Code of Practice for Design and Construction.</i></li> <li>• <i>General Conditions Of Contract, PWD 75 (Rev. 5/61).</i></li> </ul> |
| <b>Pengecualian</b>                         | Tiada pengecualian.  |
| <b>Keputusan</b>                            | <ol style="list-style-type: none"> <li>1. <b>Lulus</b> atau <b>Kandas</b>.</li> <li>2. Markah lulus adalah <b>50%</b> daripada markah maksimum yang ditetapkan (100%).</li> </ol>  |
| <b>Kekerapan Peperiksaan</b>                | Sekurang-kurangnya sekali setahun  |
| <b>Pusat Peperiksaan</b>                    | Ditetapkan oleh Panel Peperiksaan PBT  |
| <b>Tarikh Peperiksaan</b>                   | Ditetapkan oleh Panel Peperiksaan PBT  |
| <b>Tarikh Akhir Mengemukakan Permohonan</b> | Sebulan sebelum tarikh peperiksaan.  |